



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

LANE MEDICAL LIBRARY STANFORD



2 45 0173 5297

California State Library.

Presented by

LANE

MEDICAL

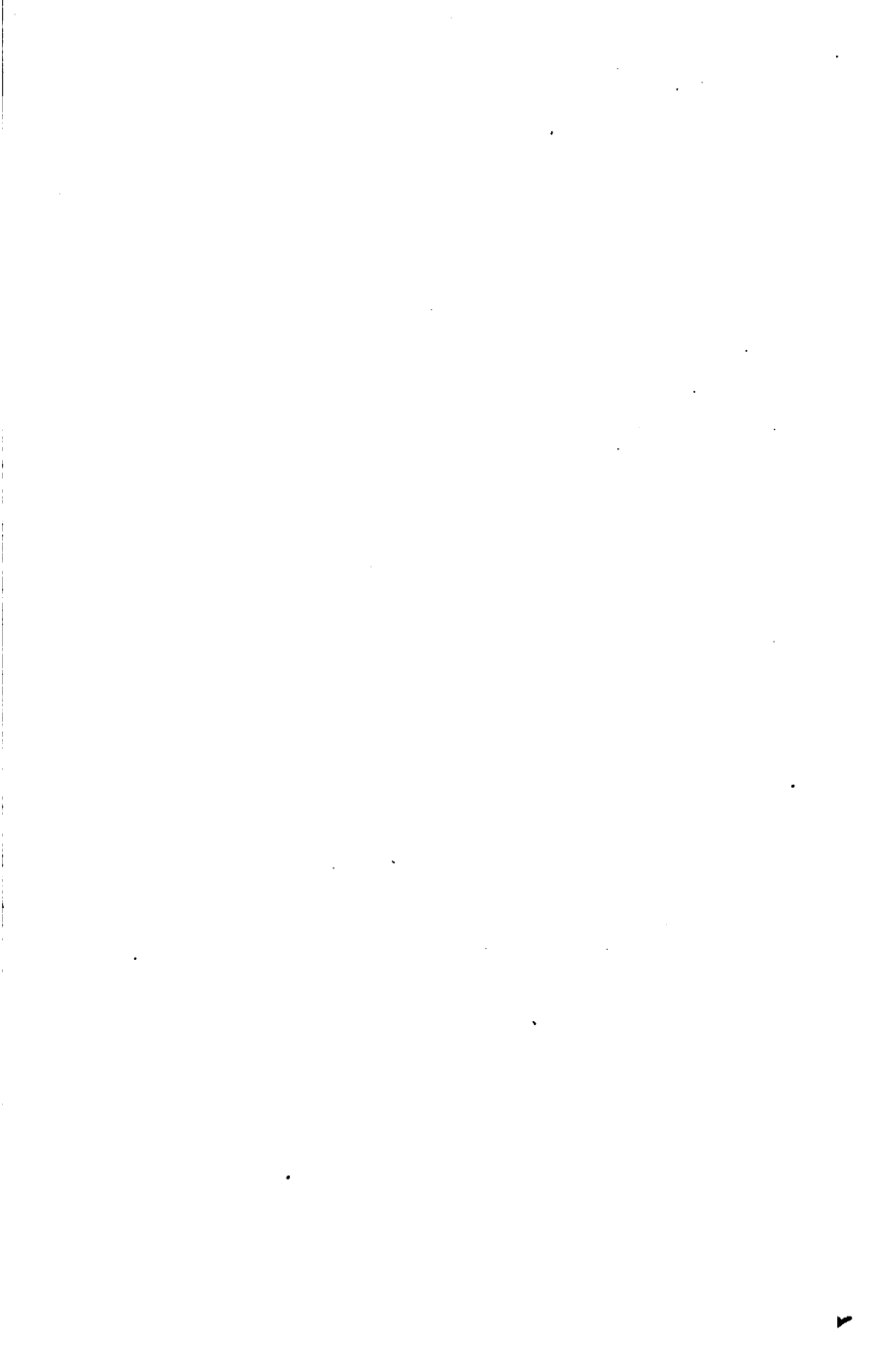


LIBRARY

G. L. Simmons

the officers of the Executive Department of this State, who are required to keep their offices at the seat of government, the Justices of the Supreme Court, the Attorney-General and the Trustees of the Library







THE UNIVERSITY OF CHICAGO

No 15-4

G. L. SIMMONS MEDICAL LIBRARY

THE MEDICAL ASPECTS

C

RAILWAYS.

LONDON
PRINTED BY SPOTTISWOODE AND CO.
NEW-STREET SQUARE

M141
F61

RAILWAYS

IN

THEIR MEDICAL ASPECTS.

BY

JAMES OGDEN FLETCHER, M.D.

F.R.C.S. &c.

MEDICAL OFFICER TO THE MANCHESTER, SHEFFIELD, AND LINCOLNSHIRE, AND
GREAT NORTHERN RAILWAY COMPANIES, ETC.

LONDON:

J. E. CORNISH, 133 OXFORD STREET

AND 33 PICCADILLY, MANCHESTER.

BIRMINGHAM: CORNISH BROTHERS.

1867.

YALE LIBRARY

M141
F61
1867



PREFACE.

THE WISH to be satisfied, by direct enquiry, as to the truthfulness of certain popular impressions about Railway Travelling and Accidents, led the Author to collect the facts contained in this work; believing that it is the duty of all men to seek for truth, and, as far as they know, teach it, he has been induced to 'publish,' with the hope that, by so doing, he is lending a helping hand to future observers.

Having frequently felt that 'ignorance occasions mistake, mistake disappointment, and disappointment misery,' whilst 'knowledge, on the other hand, gives true judgment,' which is only obtainable by individual labour; and not finding the facts in print by which to get at the 'measure of value' of certain theories that a little experience had caused him to doubt, the author hopes he may have contributed a little towards the furtherance of truth.

The present work is only intended to glance at certain things Medical, having relation to Railways,

and by no means exhaustive of the subjects it is concerned with. The Author is aware that there must be many defects and omissions, which will be more evident to others than to himself, but is content with the expression of a living writer, who said ‘ he never did or wrote anything in his life, but afterwards thought he could have done it better.’

The plan of the work has its faults, especially the Appendix of Cases, but he could not think of a better mode of condensation, by which to avoid repetition, and yet to illustrate certain important results.

A large number of the cases in the Appendix were settled in Courts of Law.

To my friend Mr. Thomas Windsor, I am indebted for much and varied assistance kindly and freely given.

35 LEVER-STREET, MANCHESTER :

August, 1867.

THE MEDICAL ASPECT OF RAILWAYS.

CHAPTER I.

THE introduction of Railways is of more recent date than may sometimes be imagined, and their rapid extension cannot fail to impress the most careless observer. Previous to 1830 this means of transit was hardly known, yet, in spite of the obstacles it had to encounter from the opposition of the selfish and interested, and the prejudices of the timid and ignorant, in 1860 there were in the United Kingdom alone 10,000 miles of railway working, and 180,000 servants of different kinds employed in connection with them. The bearing of so vast an undertaking upon the health and general welfare of the community is evidently worthy of consideration, and several points of enquiry suggest themselves as deserving attention:—

1. Is this mode of conveyance a necessity or a luxury?
2. Did it contribute to or arise from increased civilisation?
3. Were the injurious effects urged against its development realised?
4. Have we any evidence of an injurious effect on the public health?

5. What effect has it upon the various *employés*?
6. What effect upon the passengers?
7. What are the causes of accidents to passengers and *employés*?
8. In what respects are these accidents peculiar?
9. What permanent effects follow these accidents?

1. Is railway accommodation a necessity or a luxury?

There is a little preliminary difficulty in defining what is a necessity, but for our purpose it is sufficient to say that when commerce is checked and civilisation retarded for want of anything, that thing at once becomes a necessity, and there can be no doubt that the state of transit during the last two centuries was a serious impediment to the progress of civilisation and knowledge. When in 1669 a 'Flying Coach' was advertised to go from Oxford to London between the rising and the setting of the sun, it was looked upon with astonishment, and the health and safety of the passengers were feared for. In the year 1671 Sir Henry Herbert, a member of the House of Commons, said, 'If a man was to propose to convey us regularly to Edinburgh in coaches in seven days and bring us back in seven more, should we not vote him to Bedlam'!

Going to Edinburgh from London in a week was, for our ancestors, as difficult to realise as it is for us, in our present state, to understand how such a difficulty could ever have existed. But even, at this time, the hoped-for degree of perfection in travelling had not been accomplished. In 1712 the 'Newcastle Courant' contains the advertisement of a Stage Coach that will run between

Edinburgh and London *in thirteen days*, each passenger paying four pounds ten shillings. The state of the roads at this time was so bad that quick travelling was out of the question, and safe travelling nearly as problematical.

Afterwards, the revolution of 1688 rendered some improvements in the roads a necessity for the passage of troops; the post, pack-horse-men, and pedlars had long complained of their bad condition.

When the rapid transit of troops became a necessity the development of the resources of the nation increased, the demand for better communication and quickened transit was urgently felt, and all that Macadam could do did not supply this want. As early as 1676 tram-roads had been in use at the collieries in Newcastle, by which it was proved that labour was lessened and transit became more secure. In 1738 at a Meeting of the Highland Society, cast-iron rails were first recommended instead of wooden ones. Mr. Reynolds, of the Colebrook Dale Works, was the first to make use of them. The famous undertaking of the Duke of Bridgewater's Canal, opened in 1760, for a time supplied the wants of a part of Lancashire, by cheapening and facilitating transit and communication. All districts were not equally favourable for canal formation. In Lancashire, however, where increased commerce was requiring additional carriage communication, this, and other such undertakings, supplied the want for a time. Monopoly soon caused indifference, followed by delay and retarded trade. In spite of remonstrance the want was not or could not be satisfied, and a further demand for increased traffic and intercommunication made itself felt. Some districts,

where there was greater difficulty in constructing canals than in Lancashire, continued to suffer from the want, from which we had been partly relieved. Various modes for facilitating communication were suggested, and in 1800 Dr. James Anderson of Newcastle recommended railroads to be laid along the side of existing turnpike roads.

Long previous to this the power of steam had been well known, even from the time of the famous 'Fire Water Work' of the Marquis of Worcester, and from the expression of the possibility of the application of the steam engine to domestic purposes by the immortal Watt in 1769. Ten years before the latter period Robinson suggested the possibility of employing the steam engine to move the wheels of carriages. In 1787 Mr. Lymington exhibited a model of a steam carriage in Edinburgh.

In 1769 Nicholas Joseph, an engineer, constructed a steam carriage to run on an ordinary road at the rate of one kilomètre per hour. In 1800 the first locomotive engine was used on a Welsh mine road at Merthyr Tydvil. In Germany, M. Friedrichs, in the year 1811, constructed a steam carriage in which the King and Queen of Westphalia rode from one of the mines, and he claimed that he was the first to convey passengers. In 1814 George Stephenson constructed his first locomotive for Lord Ravensworth. In 1825 the Stockton and Darlington railway was opened as a mineral line, George Stephenson having been its engineer, and Mr. Edward Pease its originator. In America the first mineral line was laid in 1820 from Boston to Quincy; in France in 1823; in Belgium in 1834; in Germany in 1830; in Russia in

1838; in Holland in 1853; in Sardinia in 1853; in Sweden in 1854; in India in 1855.

Great Britain can with pride boast of being the pioneer of railroad development, and it was so from the necessities of increased commercial prosperity and the development of its abundant natural riches. The monopoly of canal transit, and its inadequacy of accommodation for increased traffic, especially in Lancashire, soon made greater facility of transit necessary. Although the principle of railway construction was well known and had been successfully applied to the tram-roads for mineral traffic, it was not until 1822, when Mr. James exhibited his survey of an intended line from Manchester to Liverpool, that an approach to the practical application was effected, and even then it was only contemplated to convey merchandise from Liverpool to Manchester in from four to five hours. Notwithstanding its obvious necessity, and the desire entertained to carry out the scheme, it was October 29th, 1824, before the first prospectus of this line was issued; and when it was proposed to convey passengers as well as merchandise, there was a vast number of objections, many of them purely of a selfish character, and others on sanitary grounds. The smoke from the engines, it was said, would kill all the birds in the district through which the line passed. It was also alleged, that the sparks from the engine would set fire to the goods it conveyed, and to property in the immediate vicinity of its course; that passengers could not breathe in a train going so quickly, and that, if they escaped this death, they might be 'sick unto death,' a condition supposed to be far worse

than sea-sickness, or be scalded to death by the bursting of the boiler; that the lives and limbs of passengers would be in danger in various ways. Railway travelling was spoken of, at this time, by the 'Quarterly' as being about as safe as being fired out of a rocket. The promoters of this great national boon had these and so many other prejudices, fears, and selfish notions, to overcome, that it was the 6th of October, 1829, before the undertaking was fairly started. On that day the prize of 500*l.* offered for the best adapted locomotive engine was contested, and assigned to Mr. Stephenson's 'Rocket.'

It is a memorable day in our profession, as Dr. Anderson may fairly be considered the first suggester of tram-ways along our high roads; and the first engine on the first line was driven by the son of a medical man, himself once intended for the medical profession, Charles Fox, better known as the constructor of the Crystal Palace in 1851, than as the engine-driver on the first line in England intended for merchandise and passenger traffic.

The official opening of the Liverpool and Manchester line did not take place until September 15th, 1830, and I well remember the thousands of spectators that lined the embankment to see this wonderful machine that was to revolutionise everything. I can now recall how it flew past those expectant and astonished thousands, and think I hear those loud and hearty huzzas that burst from their lips. There was a general impression that the vast undertaking ushered in a new era in the national progress. Yet the day was not one of unalloyed pleasure, but was darkly clouded by the accidental and melancholy death of

Mr. Huskisson, to whose memory Lord Brougham paid a noble tribute in his speech in connection with this undertaking: ‘When I saw the difficulties of time and space, as it were, overcome; when I beheld a kind of miracle exhibited before my astonished eyes; when I surveyed mosses pierced through on which it was before hardly possible for man or beast to plant the sole of the foot, now covered with a road bearing heavy waggons, laden not only with innumerable passengers but with merchandise of the largest bulk and heaviest weight; when I saw valleys made practicable by bridges, of ample height and length, which span them; saw the steam railway traversing the surface of the water at a distance of sixty or seventy feet perpendicular height; saw rocks excavated, and the gigantic power of man penetrating through miles of solid mass, and gaining a great, lasting, and almost a perennial conquest over the power of nature by his skill and industry; when I contemplated all this, was it possible for me to avoid the reflection which crowded into my mind, not in praise of man’s success, nor in admiration of the genius and perseverance he had displayed, or even of the courage he had shown in setting himself against the obstacles that matter opposed to his course? No! but the melancholy reflection, that all these prodigious efforts of the human race, so fruitful of praise, but so much more fruitful of lasting blessings to mankind, have forced a tear from my eye, by that unhappy casualty which deprived me of a friend.’

On the 4th December, 1830, the first locomotive engine bearing merchandise passed along the Liverpool and Manchester line.

All the objections that had been raised against the Liverpool and Manchester Railway were brought against the London and Birmingham; 'it would ruin the farmer, and the country, and kill all the game.' Sir A. Carlisle said tunnels would expose healthy people to colds, catarrhs, and consumption; and although these effects were proved to be only phantoms of the imagination, the tunnel remained a standing objection. On sanitary grounds it was said that, 'the sudden immersion in gloom and the clash of reverberated sounds in a confined space, combined to produce a momentary shudder, or idea of destruction, a thrill of annihilation.' Others asserted that 'the resounding echo, rattling wheels, puffing engine, clanking chains, dismal glare of lamps, darkness made visible, would, one and all, tend to the destruction of health, of mind and body of those so weak as to avail themselves of this mode of travel through tunnels.' Drs. Paris and Walsh, Messrs. Lawrence, Lucas, and Phillips were selected as a medical committee to enquire into the effects of tunnels; and their conclusion was, that there was not more danger to the health in passing through a tunnel than upon an open railway or turnpike road. The opinion quieted the fears of some, others became convinced of the fallacy of their objections, to not a few substantial remedies were administered, the recipients of which must have lived to feel the degradation of their position. On September 17, 1838, the second great railway system, viz., The London and Birmingham Railway, was opened.

The advantages that railway communications have offered towards improving the moral, social, and sanitary

condition of a nation are more than the wildest visionary would have ventured to predict. Millions instead of thousands, have been carried from crowded cities to more salubrious places. The fatigued traveller can find rest from his fatigues in some quiet glen ; the delicate female or invalid of either sex, young or old, can now get to the sea-coast, and there inhale, to them, the very essence of life. Men may travel distances almost incredible, visit places formerly almost inaccessible, and we may congratulate ourselves that we can, at a trifling expense of time and money, be conveyed to a purer atmosphere ; that we may wander in the remotest mountainous district, and that we can visit the most celebrated cities, or the remotest regions of the earth, and much of this with as little trouble and less danger than, half a century ago, a journey of a hundred miles could have been taken. Truly the present generation should all be heroes, if, as in the time of Homer, men were considered wise in proportion to the number of the cities they had visited, and their acquaintance with the manners of their inhabitants.

‘Railways have created villages, towns, and cities, caused manufactories of all kinds to be erected, covered moors with houses, spread out natural mines of wealth, built churches, educated men and children, taken the city merchant into the country or to the sea-coast to sleep, given the poor man many of the comforts and luxuries of the rich, brought yeomen to towns, to see the imaginary streets paved with gold.’ The American adage of *Time is Money*, has become a household phrase equally with the yeoman and the citizen. Whatever of evil railways may

have caused to the nation they have amply compensated for in good, and few desire to return to the 'good old times,' so far as travelling is concerned.* Before railways were formed, the Lancashire weaver occupied one of the six working days in fetching and taking back his work.† Early in the existence of railways, a dreadful loss of life was a stereotyped phrase, the result of accidents was greatly exaggerated, and it was considered much more dangerous to travel by railway than by coach; in alluding to this Mr. Laing says, 'if stage coaches were attended with as little personal danger or injury to the public as railways, the following would be near the proportional number of casualties—

Passengers killed from causes beyond their own control	1 in 833 years.
Passengers killed from their own folly, negligence, or misconduct.	1 in 1250 do.
Persons run over in the road	1 in 550 do.
Coach servants	1 in 125 do.'

The objections advanced against the construction of railways, and the various ways in which it was stated that the public health and safety were endangered, have been, by time, proved to be erroneous; few, if any, would now be found hardy enough to say that there is danger of being choked with smoke or steam, or that men could not breathe when going at the rate of twenty miles an hour, or going through tunnels. But as the old objections were removed new ones arose, and still retain some hold on the minds of the public and medical men; and it becomes an

* History of Railways, by J. Francis, vol. ii.

† Ibid.

important question, whether these are real or groundless? In elucidating this question, and determining the effects of prejudice, we do well to remember that Buckle said in effect, that in the whole world's history there is not an example of a theory having been put away by the practical evils it has produced; 'change of knowledge alone upsets a theory.' Medical history with equal certainty confirms the painful fact, that it is difficult to deduce the true conclusions from the lessons of experience. 'For practical purposes we are satisfied with our own impressions. But should a doubt be expressed and supported by a show of reason or experience, we ask for the specific facts which have seemed to warrant the doubts of the one party and the recommendation of the other, we feel instinctively that common and familiar words are altogether wanting in precision; that they take their meaning from the character of those who use them, the *sometimes* of the cautious, or the *often* of the sceptic, while the numbers 1, 10, 100, &c., have but one meaning for all mankind.'*

My belief in the importance of numerical notation of facts in considering the sanitary condition of railway travelling must be my excuse for giving figures, when they can be obtained, in support of my opinion, when a simple assertion would have conveyed the same meaning but not with the same force. My first object will be to see what evidence there is of a favourable or an unfavourable action upon masses of people; and secondly, upon individuals specially exposed to its influence.

It may be said that anything which tends to concen-

* Guy, Cyclop. of Anatomy, Statistics, vol. iv. p. 802.

trate a number of persons within a limited area, must lower their sanitary state ; and, as a rule, this is quite true, but it is not due to the agency by which they are conveyed, but to the various occupations that necessitate their centralisation, and inability to carry out those hygienic laws dictated by nature for those living in less crowded districts. But, admitting that railways tend to aggregate masses of persons, there is not any evidence that, since railways have been increased, epidemics of zymotic diseases are more rife or virulent ; and we have not an instance of one having taken the course of any great railway system. The last outbreak of cholera in England did not proceed along any railway system, but took what had been proved to be, and was considered, the natural direction of such an epidemic. Nor do we find that typhus, scarlatina, or any of this class of diseases, is conveyed from place to place through any railway intercommunication. Nor are these diseases increased in severity in consequence of there being a railway connection from place to place.

It is well known that epidemics do exist, in great virulence, and are propagated with the same and sometimes with even greater rapidity, where no railway system exists.

In England and in all parts of the world, there are certain places that give out a malarious miasma, producing 'Paludal fevers,' as, for instance, Lincolnshire. It was, at one time an important sanitary question, how far travelling by rail, through such a district, rendered the travellers liable to these diseases ? But we have since had abundant evidence,—*first*, that the very making of a rail-

way, by the drainage consequent upon it, has to a considerable degree lessened the miasmatic emanations and the frequency and severity of ague; *secondly*, that the mere journey through such a district does not render individuals liable to these fevers, as persons in good health possess immunity against them, sufficient for their protection, and the great rapidity of railway transit diminishes the chance of infection.

We have not found, during the time England has been favoured with railway communication, that epidemics have been on the increase, nor do we find the value of human life to be lessened. Santa * quotes a table of Duvillard's, in which the duration of life is given, in 1817 to 1828, as 31·85; in 1829 to 1845, as 34·57; in 1846 to 1857, as 37·66, showing an increased value of 6 in forty years; due, no doubt, to the introduction of improved sanitary laws.

‘Some are accustomed to mourn over our feeble and degenerate race, wishing for the vigour of ancient athletes and gladiators.’† Santa ‡ quotes from M. Vilerme on the relative mortality in France, which in 1780 was 1 in 29; in 1802, 1 in 30; in 1820, 1 in 39, showing that, whatever our ancient vigour may have been, the loss of it is compensated for by an increase in the value of human life. With the diffusion of sanitary knowledge and increased civilisation, there must be a compensating advance in the duration of man's life; ignorance and barbarism being

* Chem. de Fer et Santé pub., par Dr. Santa, p. 7.

† Ibid.

‡ Ibid. p. 9.

intimately connected with those great destroyers of the human race, epidemics, war, and famine. Viewed in this light, railways are among the most potent civilisers of modern times, cannot but have an indirectly beneficial influence, and practically in no country has their introduction been followed by a decrease in the value of human life: on the contrary, in England epidemics have much diminished in frequency and severity. We do not even find in the returns of the Registrar-General any evidence of increase in nervous diseases, those which, according to popular belief, were most likely to be augmented by railway travelling. In Table A * it will be seen that, in the year 1851, the returns of deaths in London from diseases of the nervous system, including diseases of the brain, are in about the proportion of 1 to every 400 of the population; whilst, in 1860, the same returns give the proportion of deaths from the same diseases as 1 to every 411 of the population, and in 1859 as 1 in every 415 of the population; taking into account that the various hospitals in the city have contributed to increase the death-rate in proportion to the population. London being the centre of the largest railway termini, we should have evidence of any special effects in the causation of disease, did such exist, and have it represented with the greatest force; yet, as above stated, these returns afford no proof of such results in developing this class of disease: at least, the death-returns of the Registrar-General do not give evidence of it.

* See p. 15.

TABLE A.

Enumerated Population of London	1851		1852		1853		1858		1859		1860	
	2,373,081	Proportion to Popu- lation.	2,416,631		2,460,378		2,681,384		2,725,905		2,770,483	
No. of deaths from diseases of the ner- vous system . .	5938	1 in 399	5,878	1 in 411	6526	1 in 377	6,571	1 in 408	6557	1 in 415	6,749	1 in 411
No. of deaths from diseases of the brain	617	1 in 3,846	645	1 in 3,747	684	1 in 3,720	767	1 in 3,495	870	1 in 3,133	877	1 in 3,159
Sudden deaths . .	516	1 in 4,598	431	1 in 5,607	497	1 in 4,940	476	1 in 5,612	247	1 in 11,036	138	1 in 20,075
Deaths from cancer .	910	1 in 2,618	936	1 in 2,581	1,083	1 in 2,447	1,142	1 in 2,330	1,161	1 in 2,347	1,199	1 in 2,319
Deaths from gout .	57	1 in 41,633	60	1 in 49,277	52	1 in 50,763	70	1 in 38,305	77	1 in 36,700	61	1 in 45,417
Deaths from hanging.	219	1 in 10,835	312	1 in 7,745	279	1 in 9,470	78	1 in 34,376	87	1 in 31,332	95	1 in 29,162
Deaths from drowning	287	1 in 8,275	353	1 in 6,845	355	1 in 7,437	271	1 in 9,894	319	1 in 8,545	308	1 in 8,995
No. of deaths register- ed as caused directly or indirectly by Rail- way accidents . .	24	1 in 98,878	25	1 in 96,665	34	1 in 72,364	40	1 in 67,034	23	1 in 118,517	41	1 in 67,572

What effect has railway travelling upon the health of those who daily throughout the year avail themselves of railway communication?

The greater number of commercial travellers take, on the average, five or six hundred journeys in the year, and most of these are performed in the second or third class, where the succession of vibrations peculiar to railway locomotion is more decidedly felt, and where the variations of temperature, and the exposure to currents of air, are greater than in the first class. In such we should naturally expect to find all the evil effects of railway travelling upon the health. My enquiries embrace the statements of upwards of two hundred commercial travellers, of various ages and duration of service, some of whom have been 'on the road' upwards of twenty years; yet in no single instance have I been able to trace a disease peculiar to these men, as associated with railway travelling; nor do I find them liable to diseases of a kind that are not more due to their habits of life than to this mode of conveyance. Several, who have 'known the road before railway times and have worked it since,' speak very emphatically about the advantages of the 'rails over the road,' especially in winter, in matter of health; and whenever an objection has been raised to it, it has been on the ground of the great facilities it offers to 'work a much more extensive district, thus entailing upon them a more laborious correspondence than formerly.' But in none of these persons, even after the most careful enquiry, and where the object of my enquiry was not known, have I been able to trace to railway travelling any functional disturbance or tendency to disease of any kind.

What effect has it upon the higher class of railway *employés*?—such as secretaries, general managers, and chief engineers, who, perhaps more than any other class of men, are exposed to the consequences of railway locomotion, by their duties obliging them to travel vast distances, often in the most rapid manner by express trains, or on engines. I am informed that the daily distance which some of these travel will average throughout the year about 100 miles. In addition, the urgent claims upon their attention oblige severe mental labour, at times greatly prolonged, causing a constant high pressure, *which, of itself*, is most trying to the health, and under which very many, more favourably situated, break down; yet I only know of one instance where a special nerve disease ensued, and in this case the serious affection only lasted *for a time*, was mainly due to Herculean mental labour, unrelieved by those needful and periodical rests, which are the only safeguards against dire consequences that have fallen upon some of our greatest statesmen; and others, too proud of their own powers to yield to nature's wants and dictates, are afterwards pitied for their ignorance of nature's laws, whilst they are admired for the vastness of their labours.

It may be said that if these men do not suffer from special diseases, their lives are shortened by the injurious nature of their duties. I am not in a position to give any correct statistics of the value of such lives, but, so far as individual enquiries assist me, I have not seen any abridgment in the duration of such lives; remembering also that many of them have, once or oftener, been exposed to

the effects of accidents, it is only to be expected that we might find instances of the most severe consequences of railway travelling upon individual health. On the contrary, these gentlemen, so far as we are able to ascertain, enjoy an average share of health.

What is the effect of travelling upon railway guards? Their duties vary considerably, according to the kind of train and the districts through which they travel. Those on the North and South express trains, running over about 400 miles a day throughout the year, with few interruptions, through various changes of atmosphere, from London to Scotland, are occupied about ten hours, with only short intervals of rest, travel at very high speeds, and are often on their feet during the greater part of the time, without cushioned seats, or nicely balanced springs, to lessen the shocks or vibrations that are said to be specially injurious to railway passengers.

Guards of the ordinary passenger and luggage trains travel over much shorter distances, but are often occupied for the same or a longer time, and are exposed to the greater jar and vibration occasioned by the use of the break at their frequent stoppages. Out of seventy-four guards, whose ages vary from twenty-three to forty-three, and period of service from two years to over twenty, many of whom have guarded express trains for more than ten years, and have been exposed to many casualties from accidents,—one of these men, during a long period of service, had been in no less than fourteen accidents, and had escaped without the slightest mutilation, whilst a guard of one of the longest and fastest English trains says ‘that he

never felt in better health, never was off work more than two days, except on one occasion, and that was owing to an injury to his knee, which laid him up for two weeks'—not a single one had suffered any permanent impairment.

I have not been able to find out any disease to which these men are liable; not an instance of one who had to give up his duties in consequence of rheumatism, loss of muscular power, or other infirmities; and, so far as my enquiries led me into the natural history of guards, so to speak, the great majority of them, after periods of service which vary from ten to twenty years, by care have saved money, with which they are enabled to embark in some business, and thus live out the remainder of their lives in comparative indolence, and not unfrequently indulge in habits which tend more to shorten their lives than their previous occupation had done. In my enquiry I was directed to the case of one guard, said to have died from the effects of railway travelling two years after having resigned his office and entered upon the business of inn-keeper. The medical man that certified to his death gave a certificate of his having died from delirium tremens, a disease that is well known to be much more common among innkeepers than railway guards, and one that has never hitherto, even by the most imaginative, been said to be in any way associated with railway travelling as cause and effect.

I have not been able to obtain any returns of the average yearly sickness amongst railway guards, but have been informed by men largely connected with Friendly

Societies, in which the majority of them are members, that the general opinion is, that they rank amongst the best members, so far as the rarity of their claims upon the funds is concerned. It might be said the value of this opinion is lessened by the fact, that even when off duty from sickness, unless it be very protracted, their wages are regularly paid to them by their employers, so that their demand for aid from such Societies is no criterion of their health or sickness. But it is well known that these men do not allow the continued reception of their wages to prevent them enforcing every possible claim upon such Societies.

Drivers and Stokers—so far as their sanitary condition is concerned—have been made the special theme for a work by Dr. Duchesne, of Paris, entitled ‘*Des Chemins de Fer et de leur Influence sur la Santé des Mécaniciens et des Chauffeurs,*’ in which he says, ‘they are placed at the head of the train, in exceptional conditions, exposed to great vicissitudes of the atmosphere, and dangers, which show the certain good or bad influence of their occupation, and the lives of the passengers are at all times in the hands of the driver having charge of the train.’ Duchesne, entering into the origin of drivers, as to their education and preliminary knowledge, says, that ‘in Germany, after serving an apprenticeship, they are examined as to their knowledge of the construction and repairs of an engine before they are allowed to drive. In France, they are first occupied on ballast trains, then on the second engine of a goods train, and after about two years they are allowed to drive passenger trains.’

In England, drivers enter between the ages of fifteen and twenty years, as cleaners, for three years; they are then promoted to be firemen or stokers to a goods locomotive, at which they remain for three years, when, if their characters are satisfactory, they are allowed to drive* goods trains, afterwards those for passengers, the best being selected for the express ones.

Duchesne says, 'The excellent conditions of security for passengers have rendered it necessary to augment the power of their engines, the number of their carriages, and increase of speed; and to arrive at this result, they have increased, in the same proportion, the work of the drivers and firemen.'* In support of this conclusion, he gives the example of a driver being occupied 15 consecutive hours in going a distance of 228 kilomètres, about 142 miles; and another, where 12 hours were occupied in going 212 kilomètres, about 125 miles. This proves the various 'courses' of goods drivers on the different French lines to be about 150 to 400 kilomètres, or 93 to 250 miles, and that they are employed about 16 hours—by no means a very good example of speed, although they show a very prolonged service. If it were not for the fact, well known to everyone conversant with railway working, that goods drivers have frequently prolonged intervals of rest on their journeys, either whilst shunting to allow trains to pass, or in taking up fresh goods at intermediate stations, no one would doubt the impropriety of such prolonged service, and the injurious results it would have

* Page 38.

upon the health of such men, which he says* is remarkably evident, and that after 'fifteen years of service drivers become incapable of managing an engine, and have to give up their employment.'

- * If this remark is intended to apply to goods drivers alone, it becomes a self-evident mistake, for the simple reason that it is a rare exception for a driver to remain in such a position for the time necessary to incapacitate him.

Dr. Santa,† referring to Dr. Duchesne's statements, says, that the average distance run by a driver per annum is, in France, 28,896 kil. or about 17,550 miles, and that they are daily on duty for about sixteen hours or more; and quoting Drs. Bisson and Devilliers, who have contradicted Duchesne, he says that, as the question is one of importance, because a great part of the security in railway travelling depends upon the driver, he has referred to the Commission of the *Enquête*,‡ who made a special enquiry into the conditions of the drivers and firemen on the various lines in France, as to their mode of admission; nature of their duties; duration of their work and scale of remuneration; and the conviction of the Commission from their enquiry was, that 'the normal conditions of work demanded from drivers and firemen are of a nature to secure good service without depressing the force of the men.'

Santa gives the average duration of service on the Ligne de Paris à Lyon :—

* Duchesne, p. 41.

† Chem. de Fer et Santé publique, page 39.

‡ C. Paris, 1858.

Express trains	8 hrs. and 24 m.
Omnibus trains	10 " " 59 "
Goods trains	10 " " 57 "

as the time occupied from starting to arrival; and says, the time is not too long, nor the work too fatiguing.* The average monthly distance run by a driver of a passenger train

is 3,200 kil. to 3,400 kil. or 2,000 miles to 2,125 miles.

Goods trains 3,400 " " 3,600 " " 2,125 " " 2,250 "

On the Ligne d'Orléans the monthly distance never exceeds 3,360 kil. or 2,100 miles.

The longest daily journeys that drivers make in France are from Tours to Angoulême and back.

428 kil. about 265 miles,
and Paris to Tours 470 " " 295½ "

and the time occupied in these journeys varies from 8 hours to 9 hours and 20 minutes, whilst the average daily service of other drivers on intermediate stations is from 8 hours to 10 hours by passenger trains, and from 6 to 8 hours by goods trains. The average distance gone over by passenger trains is 117 kil. about 73 miles, and goods trains about 107 kil. or 67 miles; we see, therefore, that the long journeys are an exception. In contradiction to Duchesne, Santa says the average daily distance travelled by a driver varies from 120 to 240 kil., and the time occupied is between 6 and 10 hours, according as it is a passenger or a goods train. As to the fatigue of drivers alluded to by Duchesne, Dr. Devilliers,† chief medical

* Santa, p. 42.

† Recherches statistiques et cæt. Paris, 1857.

officer to the Lyons Railway, says, the fatigue of drivers does not depend so much upon the distance gone over or the speed, nor upon the greater or lesser number of miles travelled in the 24 hours, for there is relatively less exhaustion to the driver of an express train, which travels the maximum distance in the minimum of time, than to the driver of an omnibus train.

Dr. Bisson, chief medical officer to the Orleans Railway, in reply to Dr. Duchesne, says,* ‘the excessive fatigue which the *employés*, drivers, and firemen, experience, is as imaginary as the diseases to which he has condemned them, and the exhaustion results less from the number of miles travelled, than from the time passed on the engine; and those who conduct an express train from Tours to Paris are less fatigued than those who bring a train of goods from Orleans; the first run about 6,000 kil. or 3,750 miles, the latter 3,000 kil. or 1,875 miles per month,’ and average about 200 and 100 kil. per 24 hours.

In England drivers of goods trains are at work about 13 hours, and will run about 100 miles daily, with sufficient intervals for rest and meals. Drivers of passenger trains average about 11 hours per day, and the distance varies from 80 to 220 miles; those driving the shorter distances are often engaged longer than those driving express trains over a greater distance. The fatigue is always said to be in proportion to the time on the engine, and not to the distance or speed travelled.

The longest average period that drivers continue on the railway is about twenty years, and during this time, I am

* Guide médicale à l'usage des Employés des Chemins de Fer. Paris, 1858.

informed, that they generally save money enough to enable them to take a small inn, or to buy a little land to which they devote themselves. I know a driver, aged fifty-four years, who is still a very efficient man.

Dr. Duchesne says,* 'if we listen to public opinion as to the effects railway travelling has upon the health of the drivers, we must believe the latter to be injured by the cold, rain, and sun, to all of which they are exposed;' but he says that engineers and medical officers connected with railways inform him, that, of all workmen upon them, drivers and firemen furnish the fewest cases of sickness, and the Chemin de Fer du Nord, having seventy-three drivers, has rarely more than two sick at once; in 1865 it was five months without having one ill, and he has seen a driver who had been in perfect health for ten years. As a general rule, when drivers have been at work about two years they become more vigorous, and 80 per cent. of them get stout; but he thinks the latter 'is not attributed to fresh air alone, but to the contentment caused by increased salary and better food.' He gives instances where delicate persons occupied as drivers have been restored to perfect health.

If we consider the vastness of railway development which is represented in a table given by Duchesne as to the lengths of lines working in 1854, we shall see the importance of such considerations as these.†

In Europe alone, in that year, 50,425 kil. were authorised and 29,190 kil. in work. In the United Kingdom, during the year 1855, there were 8,280 miles of line in

* Chem. de Fer et cœt. p. 56.

† Ibid. p. 66.

work, and 97,925 servants employed upon the lines then open—ample numbers to test the effects of various causes upon the health of individuals. It must be admitted that if railway travelling has any special tendency to produce disease, it would show itself in drivers and firemen. Since their sanitary condition and susceptibility to various diseases have been the subject of special study by Dr. Duchesne, we may reasonably inquire what are his opinions, and upon what facts they are founded; and whether they are in harmony with the opinions of others?

The first disease which he ascribes to them is *Lumbago*, due to fatigue, from long standing, and to shocks caused by vibrations of the engine and tender, which occasion pain in the joints and a general weariness of the limbs, if not lumbago.

Rheumatism, he says, does not generally come on during the first few years, but after ten years' exposure to the incessant shocks of the engine and the vicissitudes of the atmosphere, pains in the lower extremities are felt, and particularly on the right side, with coldness of the knees. These pains extend to the right arm. Their effects upon the right side are very constant, and evidently depend upon the position occupied on the engine. When the driver is left-handed, the left side becomes affected. He thinks these pains are rheumatic in character.

'*Maladie des Mécaniciens*' is a name he assigns to a class of symptoms, which he says are peculiar to drivers and stokers, differing from rheumatic pains: 'continuous, persistent, dull pains, accompanied by a feeling of weariness.'

ness and numbness, rendering their walk to the station very painful. These sensations affect the femero-tibial and tibio-tarsal articulations on the right and left sides indiscriminately, and when the driver is suffering from them he feels a difficulty in descending from his engine after a journey.' These affections, he thinks, are probably due to the 'softening of the spinal marrow, caused by standing too long, and by the continual trepidations almost inevitable in locomotives.' These symptoms, he says, increase with every year of service, until, from inability to ascend on and descend from the engine, they are obliged to give up their duties.

Dr. Duchesne states, that he has inquired of drivers in France, whose period of service varied up to twenty years, and he finds that at this period they are not able to continue an employment so fatiguing, and that they give it up for one less exhausting.

In support of this theory he cites M. Reynal, who, in a report connected with the Agricultural Exhibition in Paris, in 1856, stated that a great number of the cattle transported by rail to the Exhibition had the articulations of the feet and knees very sensitive, and that the sheaths of the tendons and articulations were swollen.

Neuralgia of the face, and sciatica affecting the right side, are due to the cold air striking that side of the face, from the position the drivers occupy on the engine.

Cramps, he says, often affect drivers and stokers during the night, and are often very violent; they are caused by the continued strain upon the muscles, in trying to obtain

a position of rest—upon the points of the toes, and to avoid the fatigue and diminish the force of the vibrations of the engine. To do this, the muscles of the back of the leg are excessively taxed, and hence the cramps when asleep.

Intermittent Fever affects drivers in going through malarious districts, and that to such a degree that several have been obliged to leave the district or give up the employment.

Bronchitis and *Phthisis* are also amongst the diseases to which drivers and stokers are liable.

Pneumonia and *Pleurisy* are sometimes developed from exposure to cold, damp, travelling through tunnels, and inability to change wet clothing.

Jaundice he has seen induced by the emotional excitement caused to a driver who had just escaped a serious danger. At the end of his journey he was jaundiced and obliged to take to his bed.

Diarrhœa often attacks drivers and stokers, when exposed to cold, damp, and the shaking of the engine.

Cystitis. In 1850 many of the drivers, &c. of the Chemin de Fer du Nord had pain in the bladder, which was attributed to the cold penetrating between the folds of their paletots.

Typhoid Fever and *Cholera* sometimes attack drivers and stokers.

It will be seen, from the variety of diseases named, that Duchesne has assigned to drivers a formidable list, yet not more than actually occurs amongst them; for, whatever may be the peculiar susceptibility of any class of artisans

to special affections, it does not exempt them from those that are common to all mankind, and it would be strange indeed if we did not occasionally see amongst them such diseases as bronchitis, cystitis, jaundice, and fevers. But the '*Maladie des Mécaniciens*,' that he cites as special to these *employés*, requires more serious consideration, and we will discuss it. There is one fact that militates very considerably against the theory of their suffering in a special manner, and in excess of other *employés*, viz. that it is found that men employed in the working of the traffic, such as drivers, stokers, guards, are less liable to disease than any other class. We cannot indeed support the statement by statistics obtained in England, although my own enquiries justify me in the assertion, but we may adduce Drs. Bisson and Gallard, of the Chemin de Fer d'Orléans, who, in their report for 1858, give—

684 cases of sickness, 55 deaths	{	<i>Employés</i> at the works . . .	4,239
		Permanent way . . .	2,057
		Traffic . . .	551

Average daily sickness . . . 6.152

Mortality for every 100 sick . . 0.8033

In 1859—10,321 cases of sickness; 78,746 days absent from work. Average duration of sickness, 10 days in workers of traffic, and 7 days in the other services.

In the '*Compte rendu*' for 1860, Drs. Bisson and Gallard give a special table of the comparative mortality of individuals in Paris between the ages of twenty and fifty-five years.

The average of the population of Paris during the last

four years, from 1855-59 was 1,063,227 and the mortality 9,892. And in every million of inhabitants there were 465,926 between the ages of twenty and fifty-five years; and the annual mortality was 9,303, or 19·9 per thousand.

In 1859 the population of Paris was 1,130,488, containing 526,670 individuals between the ages of twenty and fifty-five years. The annual mortality was 10,840 or 20·8 per thousand.

The *personnel* of the Compagnie d'Orléans was 12,494, and the deaths 75: in the proportion of 6 per thousand.

As Dr. Santa says, these figures are too eloquent to admit of comment.

The Mortality Returns of the quarter ending September 1864, published by the Manchester Sanitary Association, compiled by Mr. W. Royston, show that, out of a population of 424,655, there were 2,804 deaths from all causes, or 6·6 per thousand, being a greater mortality than that of the *employés* on the Orleans line. In the same return it is shown that the number of deaths from diarrhoea was 486, or 1·17; and diseases of the lungs 469, or 1·1 per thousand; thus showing that deaths from diseases of the digestive organs rank first, and diseases of the lungs second.*

Dr. Oulmont, medical officer to the Orleans and Lyons lines, has classified the diseases seen in two divisions of active service, drivers, firemen, and guards:—

* Santa, p. 195.

Nature of Diseases.	Drivers and Stokers.	Guards.
Diseases of brain and spine	72	75
„ the nervous system	23	25
„ the heart and organs of circulation	13	8
„ the organs of respiration	466	322
„ the organs of digestion	766	657
„ the genito-urinary organs	14	8
„ the joints	198	111
„ the muscles	128	232
„ the skin	69	40
Fevers, eruptive	227	157
„ intermittent	71	54
Organic diseases	20	17
Specific diseases	7	8
	<hr/> 2,074	<hr/> 1,714

It results that the diseases, in the order of their frequency, are—

1. Disease of the digestive organs, dyspepsia, &c.
2. Disease of the respiratory organs, as bronchitis, pleurisy, &c.
3. Disease of the joints and muscles, as rheumatism, lumbago.
4. Disease of the nerve centres, as cephalalgia, congestion, &c.
5. Disease of the skin, as eczema of the hands.

Dr. Devilliers states, that in the ‘Service du Mouvement’ diseases of the organs of respiration and digestion occur most frequently, and that there is no malady special to the profession, or directly attributable to the employment.

Service de la Traction—Personnel actif.

1. Diseases of the respiratory organs.
2. Diseases of the digestive organs.
3. Diseases of the eye. Affections of the eye are generally slight and of an ordinary character.

In drivers and stokers, diseases of the digestive organs, of joints, of muscles, intermittent fevers, injuries, abscess, —such is the order of their frequency.

‘*Ateliers*’ and others employed on railways do not present anything very peculiar in the diseases affecting them. Dr. Santa says,* that the sickness is greater amongst the workmen in the shop than those in active service; that there is nothing special in any of the diseases of *employés* except colic in painters, and that the number of deaths is about the same in the three services.

Dr. Devilliers, medical officer to the Lyons line, says† that in the ‘*Service du Mouvement*’ the diseases, in the order of their frequency, are—

1. Diseases of the respiratory organs.
2. „ „ digestive organs.

Service de la Traction.

1. Diseases of the respiratory organs.
2. „ „ digestive organs.
3. „ „ eye.
4. Fevers (rare).
5. Abscesses.

* Santa, p. 199.

† *Moniteur des Hôpitaux*, 1858.

6. Diseases of the skin.

7. „ „ head.

8. Varices.

9. Hernia.

‘*Service de la Voie.*’—These are the most healthy, being constantly engaged at out-door work.

1. Intermittent fevers.

2. Diseases of the respiratory organs.

‘*Bareux de l'administration.*’—The men present nothing special in the diseases, and in the order of their frequency we have—

1. Diseases of the head and nervous system.

2. „ „ respiratory organs.

3. „ „ digestive organs.

Amongst the *general causes* of these internal diseases he gives epidemic influences, seasons, meteorological changes, situation and nature of the country.

Individual causes are cold, want of care, improper food, and exertion.

External diseases, he says, are generally the result of accident or imprudence.

The same author gives the following table, showing the proportion of sickness in the different classes of *employés* for the years 1858 and 1859, representing 13,210 servants.

	A	B	C	D
	Adminis- tration	<i>Employés</i> at the Works	Traffic	Permanent way
Total of servants . .	719	5,468	3,557	3,457
Internal diseases . .	260	4,256	3,006	1,880
External do. . .	200	2,356	1,402	714

Number of cases of sickness per 100 *employés*: A. 132; B. 120; C. 123; D. 66.

Santa says it is the same in railway employment as in all individual employments, viz. that the most active are the most healthy; when at the same time sober and regular in their habits.

‘Does there exist any disease special to drivers and firemen?’* such as—

- A. Special nervous affection.
- B. ‘Disease of drivers’ (Duchesne).
- C. Rheumatic pains.
- D. Intermittent fevers.
- E. Injuries to the ear.
- F. Injuries to the eyes.

Santa, quoting Dr. Oulmont, says, ‘it is difficult, *à priori*, to suppose that employment which obliges persons to be daily, for several hours, near an intense fire, on a machine in a constant state of motion and vibration, exposed to all atmospheric changes, with all his senses on the stretch to avoid dangers, should not injure the health; but statistics collected of late years show, on the contrary, that it improves the general condition, increases the force of vital resistance, develops embonpoint, and counteracts any injurious external influences.’

Special nervous affections. Dr. H. de Martinet, in a communication to the *Académie des Sciences*, ascribes paralysis of respiration and congestion of the lungs, to the cold air and inspiration of carbonic oxide and carbonic acid;

* Santa, p. 206.

products of combustion. These gases effect the nervous system and develop series of symptoms, such as disturbed sleep, convulsions, failing of intellect. Dr. Duchesne, who has himself described a disease peculiar to drivers, (to be afterwards noticed,) under the head of '*Maladie des Mécaniciens*,' in answer to Dr. Martinet, says that in his enquiries amongst a great number of drivers and firemen, he has never observed such symptoms, and from his enquiries amongst medical officers of various railways, he considers the statement to be erroneous, that such symptoms exist, affirming that such symptoms do not occur in drivers, &c.; moreover, the theory of their cause must be incorrect, because, when travelling at a moderate speed, the combustion is so perfect that few if any of the products can escape at the fire-place, and those making their exit by the chimney do not affect the driver.

Dr. Oulmont's statistics, before quoted, do not, in any way, confirm the existence of the special nervous symptoms described by Dr. Martinet.

My own enquiries, made amongst drivers and firemen of all ages, embracing a very considerable number, also lead to the same conclusion, that such symptoms have no existence, that the men are not exposed to the injurious consequences of respiring these gases, and further the symptoms given by Dr. Martinet are not such as would be produced by their inspiration, it being a well-known fact that, 'disturbed sleep and failing intellect' are not amongst their usual effects, and that any inhalations of these gases short of the quantity necessary to produce symptoms of coma, have not the effect he ascribes to them. In malting, wine ferment-

ing, and lime-stone burning, men constantly inspire these gases, in certain quantities, and I have not, even in them, been able to find one that presented the symptoms described by Dr. Martinet. I am, therefore, bound to believe that they do not exist: nor do I know of any special nervous affection presenting the symptoms mentioned, in any way caused by employment on railways, or induced by railway travelling.

Disease of drivers, or 'Maladie des Mécaniciens.'—Duchesne says,* that rheumatic pains are not the only ones produced by constant occupation upon the engine, and differ from the pains characterising the above disease, which are dull, aching, and persistent, accompanied by a feeling of debility and numbness, and interfering with the use of the limbs: they are felt in the femero-tibial and tibio-tarsal articulations, on the right and left sides equally; whereas, he says, rheumatic pains generally affect the right side, so that old drivers may be distinguished by their mode of walking, which is peculiar and unsteady. These pains, he thinks, depend probably upon spinal affections induced by the prolonged trepidation on the engine to which drivers and firemen are exposed; that the disease increases with the number of years employed, until at last they are compelled to abandon the occupation.

Dr. Santa † quotes the following conclusions drawn by Dr. Duchesne from his enquiries.

1st. Generally, after one or two years' service on the locomotive, the drivers and stokers are the most robust

* Des Chemins de Fer et cæt. p. 183.

† Chem. de Fer et Santé pub. p. 215.

employés, and have the greatest power of resistance to the atmospheric changes; enjoy excellent health, and many become stout.

2nd. In general, and with certain exceptions, when drivers and stokers have continued in active service, they are fatigued after ten years; suffering after fifteen years; and hardly capable of active service on the engine after twenty years.

3rd. Drivers and stokers should almost always be replaced after twenty years' service.

4th. Irrespective of accidents, the occupation of drivers and stokers has an injurious influence on the health, which is increased with the number of years' service, shown in impaired vision, hearing, rheumatic pains; and ‘*Maladie des Mécaniciens*.’

Santa, quoting from the same author, shows that there are many contradictions in his statements, since, at one time, he says that drivers and stokers have their health injured by cold, rain, &c.; that they become liable to various diseases; and after twenty years' service are unfit for duty; and yet he states that eighty per cent. become stout, have considerable increase of vital force, and power of resisting the atmospheric influences to which they are exposed. And further he refers to Dr. Devilliers, who says of the ‘*Maladie des Mécaniciens*,’ that he has enquired from drivers of ten, twenty, and twenty-two years' service. All, he says, feel a fatigue, more or less severe, in the legs, but this never amounts to pain, and differs in nothing from that strain experienced by all workmen having a long time to stand;—that the weariness is lessened by habit,

and removed by rest. If they become ill after a certain number of years' service, it is due to their age, or mode of life, rather than to any special cause; and he concludes that the health of drivers and stokers is relatively better than of other railway workmen, excluding accidents. Dr. Cahen, medical officer to the Chemin de Fer du Nord, in his report of 1856, says he has noticed the very satisfactory state of health of the drivers, &c.; and does not hesitate to attribute it to the good hygienic conditions to which they are exposed, and to the sanitary influence of a pure and fresh atmosphere. Out of 71 drivers and 92 stokers employed on this line in 1856, 4 drivers and 36 stokers were sick, the number of days' sickness being 286. There were two deaths from cholera.* Dr. Bisson, medical officer to the Ligne d'Orléans, says that *Duchesne's 'Maladie des Mécaniciens'* has not any real existence; and that in his theory of its cause being spinal, he has given a reason for imaginary facts. He also thinks there is no foundation for the assertion that neuralgia and rheumatism affect the right side.

In two years, with 84 drivers and stokers, 28 of more than 10 years' service, and 7 of less than 3 years, he has not seen the least disease of the nervous system: the most frequent diseases were bronchitis (25), quinsy (22), and dyspepsia (28). Further enquiry has not led him to the discovery of any such symptoms as Duchesne describes.

Dr. Gallard, associated with Dr. Bisson on the Orleans line, has for a long time considered the opinion erroneous

* Union Médicale, 1858.

which regards certain classes of agents as liable to special maladies.

Dr. Oulmont says his enquiries have not confirmed the existence of that disease of drivers, spoken of by Duchesne. Many, he says, complain of muscular fatigue in the legs and loins, but all affirm that it disappears after rest; that it is impossible to say whether, if this fatigue were prolonged to a painful extent, it might not induce disease in the muscles, or the nervous system. The oldest drivers and stokers (of twenty years' service), do not suffer from the symptoms of this disease.

My own enquiries, which extend to 198 drivers and 240 stokers, of various periods of service from 2 to 26 years, have not led me to the discovery of one complaining of the symptoms described by Dr. Duchesne, nor have I been able to trace a single instance of a driver or stoker having had to give up his situation in consequence of them. All agree that the standing position, if too long continued, does induce fatigue, and that it is in proportion to the length of time this is maintained without change; but that when intervals of sitting can be obtained, it is not felt in the legs, and that it has no connection with, nor is it at all in proportion to, the vibration of the engine. It is well known that engines vary considerably in their vibratory motion, and are also affected by the condition of the permanent way. Yet, in all cases, the fatigue was said to be in proportion to the length of time kept standing without change; that it passed off after rest, and the daily return of duty did not increase its severity, provided the proper amount of rest, for which ample time is allowed, had

been taken. But when, from irregularities, the men have not availed themselves of it, the fatigue of the next day's labour has been more felt, as would reasonably be expected.

In considering the effects the vibrations of the engine may have upon the muscles, spinal marrow, &c., we need not limit our enquiries to drivers, &c., for in large towns and cities there are vast numbers of men employed as conductors of omnibuses, whose occupation is generally much more prolonged, than that of drivers of railway locomotives, and who are exposed to a constant series of small shocks by the jolting over even well-paved streets, and a succession of shocks much more intense than any felt by drivers. The truth of this assertion any one may prove by riding on the steps of an omnibus running over an admirably well-paved road or street, and in one running on a tram-way, the latter being nearly identical with a railway. The difference is most marked; and whatever increase in the number of shocks there may be by railway travelling, they are more than equalled by the severity of those felt in the slower omnibus travelling; and we should reasonably expect to find these small shocks affecting omnibus conductors, if they had any material effect.

On enquiry from a considerable number of conductor (90) in various towns, some having been so more than 10 years, and also from several drivers who had been conductors for 10 or 15 years previously, and then driven 7, 8, and 10 years, I could not find a single case in which the symptoms given by Duchesne were present. Rheumatism I found amongst them, and 6 had been obliged

to relinquish this employment in consequence of it. The utmost care did not lead me to a single case in which there were symptoms traceable, in the slightest degree, to injury of the spinal marrow.

Rheumatic pains are, by Dr. Duchesne, considered to be one of the infirmities peculiar to drivers and firemen, and he says, 'it is not possible to consider the severe, and repeated variations of temperature to which these men are exposed, but as one of the chief causes of these pains;' yet in another part, previously quoted, he says, 'these men, by constant exposure to a pure air, resist very well the causes of accidental diseases and furnish fewer cases of sickness than other *employés*,' a fact which shows, that to attribute these pains to their peculiar employments, is simply a hypothesis, and not a deduction from any number of observations. My own researches have decidedly not led me to the conclusion that they are more liable to rheumatism than other men similarly exposed, and certainly there is greater liability amongst agricultural labourers. The physical character of a district materially affects the number of those who suffer from rheumatism, and a still more potent cause is the habit of beer-drinking so prevalent in some localities. I have not found a single case in which a driver or fireman has been obliged to relinquish his employment in consequence of rheumatic pains.

Intermittent Fever is another disease to which the employment of drivers and stokers exposes them, and, according to Dr. Duchesne, it is originated by moisture, fogs, and travelling through marshy countries. But we

cannot ascribe it to the operation of the two former agents, since in Lancashire, which is proverbial for its moisture, and where fogs of the greatest intensity prevail in the large towns, the disease is of rare occurrence. The large hospitals in Manchester, Liverpool, and other chief towns, often have not a single case during the year, and when one occurs, it can frequently be traced to the poison absorbed in a marshy district, latent for a time, and developed by some later exciting cause of the catarrh, but from the former impregnation.

With regard to the third cause assigned, we find that simply travelling through marshy tracts, provided the journey extend beyond the limits of the district, does not induce the fever. My enquiries amongst the drivers daily passing through the fens of Lincolnshire, where the disease is endemic, points to the fact, that travelling through or into the country does not necessarily entail this disease; on the contrary, I have met with two cases, where the men, whilst stationary in their employment, had suffered from two (in one case) and three (in the other) attacks of ague; but who, after being engaged as drivers and travelling beyond the district, had not, during more than five years, suffered from the least return of it; this fact showing, at least, that the liability to the disease was not increased. On the other hand, drivers fresh to this district and daily travelling through it, do not become liable to ague, nor even guards who, perhaps still more constantly, travel through and beyond these districts.

Drs. Cahen,* Devilliers,† Oulmont,‡ and Santa, have considered this question, and illustrated it with the following statistics :—

LYONS LINE, fifty-four months' working. — *Employés* general, 13,588; total number of external and internal disease, 15,486; drivers and stokers, 546. 926 diseases — 57 paludal fevers, or 10·42 to every 100 persons; 6·15 to every 100 diseases. Servants on the permanent way — persons, 2,363; diseases, 1,900; fevers, 291.

Proportion of Fevers. — 12·31 to 100 persons; 15·32 to 100 diseases. Showing that fevers prevail more with men working on the permanent way than with others.

In 1857, LYONS LINE, there were 770 cases of fever in a total of 9,144 diseases, in the proportion of 8·42 fevers to 100 diseases.

EAST LINE, 1858. — Gives 490 fever cases in 14,000 diseases, or 3·50 per cent. of fever cases.

ORLEANS LINE, 1858. — *Employés* general, 984. Fever cases to 6,847 diseases, or 14·37 per cent. of fever cases; servants of, 555 cases of fever in 2,057 diseases, or 26·98 per cent. of fever cases.

Drivers and Firemen. — 4 cases of fever in 303 diseases, or 11·22 per cent. of fever cases.

ORLEANS LINE, 1859. — Servants of permanent way, 4,131; diseases, 2,092; fevers, 548, or 26·18 per cent. fever cases.

* Chem. de Fer et Santé, et cæc. Dr. Santa, 1860.

† Moniteur des hôpitaux, 1858.

‡ Note sur l'Influence et cæc. 1859.

Drivers and Stokers, 623; diseases, 655; fevers, 28, or 4.15 per cent. fever cases.

From the figures it will be seen that the number of fever cases is considerably above the average in men employed in the permanent way, and of necessity exposed to all epidemic influences, whilst in drivers and stokers it is less than the average, confirming my conclusions in the Lincolnshire district. It will be further seen that the percentage is much higher on some lines than on others, due, no doubt, to epidemic influences, and not to the employment, as Dr. Duchesne says. Agues have their origin in the neighbourhood of swamps, in the removal of masses of earth, and the formation of embankments, by the effluvia of stagnant waters, influences likely to arise in the construction of railways.

Dr. Oulmont had observed in the valley of Lutzelbourg (in the Lower Rhine) an epidemic of intermittent fever which infected nearly three-fourths of the inhabitants of the valley, and arose from disturbing earth in carrying a railway through a narrow and moist valley. After the completion of the work, the disease considerably diminished.*

On the Eastern line of France intermittent fevers have lessened in a remarkable manner. In 1858 there were only 490 cases in a total of 14,000 diseases, and the valley of Lutzelbourg in particular was quite healthy.†

Dr. Devilliers, in speaking of intermittent fevers, says they are less frequent in the *employés* on the road and in

* Santa, p. 237.

† Recherches statistiques et cæet. Paris, 1857.

the factories, being only one-ninth in the whole of the servants; but more than this amongst those employed on active service and mechanics, which is explained by the circumstance of the residences of some of the drivers and stokers being at certain depôts on the line, where intermittent fevers are endemic, and attributes the origin of these fevers to the same causes as does Dr. Oulmont, and not, with Dr. Duchesne, to the special effects of the employment.

On the Ligne du Lyon, in the spring and autumn, when these fevers are most common, they are more or less active according to the degree of heat and humidity with which these seasons are attended, showing that the existence of certain meteorological and other changes are necessary to their development.

Drs. Bisson and Gallard, in their annual reports of the state of the Orleans line, say, that the hygienic conditions of railway *employés* enables them, in a very considerable degree, to resist the causes of disease and particularly of those diseases which induce intermittent fevers, by changing their residences; and recruiting the sickly with more healthy; improving their diet; use of quinine, and other tonics.

The most important influence Dr. Duchesne attributes to railway travelling is its effect upon the special senses. It is stated that the eyes of drivers and stokers are constantly on the stretch, and exposed to the injurious effects of small particles of coke and sand; that although many were originally long-sighted (*presbyopic*), in most of them this peculiarity falls off in proportion to the number

of years of service ; and that the glare from the fire of the furnace, caused by the frequent opening of the door to supply fuel, causes them to see objects of a red colour, which false vision passes off after the closing of the door, and by shutting the eyes for a second or two. The dazzling light of the sun and its reflection from white surfaces have also an injurious effect. I have not been able to trace out any cases in which presbyopic drivers, stokers, or guards, have from any or all of these influences become myopic. Nor is it at all likely to result from the injurious effects of small particles of coke or sand, or the strain upon the eyes, or the glare from the fire of the furnace. The first often does set up some conjunctival inflammation, but in no way alters the optical condition of the eye ; the second is not by any means a constant strain, the driver's look-out being frequently interrupted by his attention being drawn to other duties, &c. ; the stokers and guards also have considerable intervals of relief and rest to the eye. None of them work, like engravers, for long unbroken periods of time upon minute objects intensely illuminated by artificial light, where the consequent injurious effects are well known.

My enquiries respecting all kinds of *employés*, who take daily journeys, particularly drivers, stokers, guards, and passengers, lead me to the conclusion that no such effect as this is ever produced. A surgeon connected with a large ophthalmic institution informs me that he has never seen a case of this kind, nor any impaired conditions of the visual power of the eye, attributed or attributable to these employments, or to this mode of locomotion.

Dr. Bisson says, in two years, out of 80 *employés*, 40 drivers, 12 apprentices, 33 stokers—28 having had more than 10 years of service—there were not any that complained of a diminished power of vision, but, on the contrary, many said it had increased.

Dr. Devilliers says, after having taken into account the inconveniences caused by the colour of certain white ballasts, the rays of the sun, and the fatigue which results from the necessity of examining the fire, that he rejects entirely the idea of any independent organic lesion as peculiar to railway *employés*.

Injuries to the sense of hearing, even deafness, have been attributed by Dr. Duchesne, in drivers and stokers, to the frequent, sudden, and shrill whistling to which their employment exposes them. He quotes Dr. Ménière, who says, that to live in a dull, intense, and prolonged sound predisposes to deafness. I have not been able to find any case of deafness in drivers caused by the effects of the whistle, although some of whom I enquired had been drivers for more than twenty, and one man upwards of thirty years. Every one who hears it for the first time, when riding upon the engine, must acknowledge that it is by no means a pleasant sensation, and that, for some seconds after the sound has ceased, there is a feeling of prolonged vibration of the *membrana tympani*, which does amount to pain, but very soon the ear becomes, as it were, educated to the sound, and no longer suffers the painful sensation, nor is the sense of hearing in the least impaired.

Boiler-makers, factory workers, &c., exposed to the con-

stant noise of hammering and the rattle and whirl of machinery, which are painful and deafening to a person hearing them for the first time, are not specially liable to deafness; neither have I found any peculiar tendency to it amongst drivers and stokers, where the shrillness of the sound may be more intense, although the interruptions and consequently intervals of rest to the ear, are more frequent and prolonged than in the case of the workmen before-mentioned.

Dr. Devilliers says, that he has not seen any insensibility of the ear, that was not attributable to the age of the individual or to exceptional circumstances.

Dr. Bisson says, that in drivers and stokers there is not any special effect on the ear induced, and that in eighteen years he has had only one case of deafness.

CHAPTER II.

ACCIDENTS.

IN considering the Accidents connected with Railway travelling, we may first view the causes, as to their being the result of negligence, or events peculiar to the fallibility of human nature and human constructions.

In England the popular feeling is, that all or nearly all accidents could be avoided by proper care, and we are apt to think, had it not been for Lord Campbell's Act, making railway companies pecuniarily responsible for injuries resulting from them, such casualties would occur more frequently, and that the precautionary measures which have been taken to prevent their occurrence would never have been adopted.

It will be my object to show, that in countries where Lord Campbell is hardly known, and certainly where none of his Acts are in operation, accidents do occur, and in some cases more frequently than in England.

In America it is a well-known fact, that there are more accidents, and a greater mortality from railway travelling than in England, whilst in France, Prussia, Belgium, &c., there are fewer; but deductions from a limited experience, and the comparative results of one year in different countries, do not give anything like an accurate representation of the facts. In France, from a report published in 1862, in reply to certain complaints of the frequency of railway

accidents, it was shown by official returns that, out of 777,450 trains yearly passing over more than 70,000,000 kilomètres, only 44 lives were lost, being equal to 1 in 7,000,000 passengers. On comparing railway accidents with those caused by carriages in the streets of Paris, it was found that more deaths result from carriage accidents in Paris in a year, than from all the railways in France in ten years. It is not right to compare one year with another, and draw the conclusion that because accidents are more frequent at one time or place, these are necessarily due to greater negligence. The Board of Trade returns for '1842 showed that 18,000,000 passengers were conveyed by railway, and only 1 killed whilst riding in a train, and observing the proper degree of caution.' Yet we should hardly conclude that this was what may be called the normal mortality from railway travelling. E. With says,* that on certain lines, the accidents are more numerous than on others, placed in the same conditions and with equal traffic. He thinks the difference in working the lines makes accidents less frequent on the German and French, than on the English ones, where the people demand more frequent and more rapid trains. It is not difficult to prove, that this is by no means the sole explanation of the frequency of accidents in certain places, and statistics show that English railways compare favourably with those of France. The returns published in the *Enquête* on eleven French lines show, that during the year 1855 there were 30,646,752 passengers conveyed; of these 34 were killed (4 from their own imprudence),

* Les Accidents sur les Chem. de Fer.

and 93 injured (10 from their own rashness), or 1 killed out of every 901,375 passengers, and 1 injured out of every 329,535 passengers. The imprudence of passengers contributes to the mortality from railway travelling, for 1 passenger out of every 7,616,688 was killed by his own imprudence, and 1 injured in every 1,915,422, or 1 passenger in every 1,532,338 was injured through want of proper caution.

The Board of Trade returns for the same year (1855) state that there were 99 accidents (21 from goods trains, and 77 from passenger trains); that in the United Kingdom there were 118,625,134 passengers conveyed, and 27,964 season-ticket holders; that there were 8 passengers killed, and 310 injured, by passenger trains, or 1 killed out of every 14,828,141, and 1 injured in every 382,661. If we take into consideration the number of season or periodical ticket holders, and multiply it by 100, which is a probable representative number of the journeys by each, and consider every journey as that of an individual passenger, we have only 1 killed in every 15,177,641, and 1 injured in every 444,661 passengers. If we take the number of passengers killed from all causes, on all lines in the United Kingdom during that year, which is given as 28, we have only 1 killed in every 4,336,483 passengers conveyed, including the individual journeys taken by season-ticket holders as before estimated, or if we exclude season-tickets altogether, there was only 1 passenger killed from all causes in every 4,236,611, being very considerably below the returns on the French lines; and although the aggregate number injured was

more in England than in France, being as 310 to 93, the proportion of the number of passengers conveyed was in England 1 in 454,661, in France 1 in 329,535.

In the Board of Trade returns for the same year we find that 20 passengers lost their lives on the various lines in the United Kingdom, from their own imprudence, being 1 killed in (if we estimate season-ticket holders as before) every 6,071,076 passengers, from want of proper caution; whereas in France there was only 1 killed in every 7,661,688, which speaks favourably for the prudence of the French railway passengers, or, perhaps more correctly, shows the value of some of the regulations on the French lines, which, though they may exist, are not so stringently enforced in England, and by which the passengers suffer; such, for instance, as the check there put upon passengers rushing into trains when in motion, or in alighting before they have come to a stand,—regulations which, if strictly enforced in England, would, by English passengers, be considered as an infringement of their liberties.

As to the normal risk that exists in railway travelling, we cannot come to anything like an accurate conclusion from personal experience, and even taking single years, on different lines, will show results, which are not consistent with what is shown in the aggregation of facts. Yet it cannot be doubted that, by a comparison of the results of a number of years, we shall be able to approximate nearer to the truth than by any other means.

The Board of Trade returns for 1854 include returns from January 1st, 1850, to December 31st, 1854. On all the lines in Great Britain and Ireland, we find that

195 passengers were killed and 1,584 were injured. Out of these 106 were killed, and 75 injured, by their own misconduct or proper want of caution. During these five years there were 400,035,310 passengers conveyed, *one* passenger killed in every 4,494,778, and *one* injured in every 374,565 by causes beyond their own control. *One* killed in every 3,773,918, and *one* injured in every 5,333,804, from their own want of proper caution. It is remarkable how large is the number of passengers killed by their own negligence, and yet it is very difficult to impress the public with the fact, that the remedy of this lamentable destruction of human life, is not in the hands of companies but in their own. There is a tendency to cry down and elude stringent regulations: and until their importance is clearly seen they will continue to encounter opposition. Since the murder of Mr. Briggs there has been a great dread of locked doors, and railway keys have become more frequent; probably greater loss of life will ensue from the consequent facility of alighting from trains in motion, than did follow from fast closed doors.

It is useless to say that companies must insist upon their regulations being strictly carried out, and that proper care and foresight on their part would prevent accidents; for, however stringently adhered to, there would yet remain many elements in their causation, some of which are beyond their control, and have relation to the seasons. In the report previously quoted, out of 195 killed and 1,584 injured between January 1st, 1850, and December 31st, 1854, 184 of the killed and 1,143 of the number injured, occurred in the five half-years ending December

31st, a period of the year during which there is certainly not the most travelling, but a time when the usefulness of signals is most impaired by fog, rain, and frost ; when the rails become slippery, and the break-power is lessened ; when metals are more liable to fracture, and, in spite of human care, give rise to an accident. If accidents were as much due to negligence and want of proper caution in working the trains, as it is popularly supposed, we should, from the institution of telegraphs, improved breaks, and the working of points, have found a considerable reduction in their number, and something like a greater uniformity than really exists ; yet in 1842 an early period of the railway era, 18,000,000 passengers were conveyed, and only 1 was killed. In the return previously quoted it is shown, that in 333 accidents which happened to passengers during the five years,—

In 1850 the number of accidents was	54
„ 1851	54
„ 1852	63
„ 1853	86
„ 1854	76
	<hr/> 333

200 of these accidents were collisions, 77 getting off the lines or into sidings, and 36 from the breaking of machinery, as axles, wheels, and the bursting of boilers.

This table shows 1853 to have been a frightful year for railway accidents, yet it can hardly be said that there were more trains or fewer precautionary means adopted by companies to prevent them, than in the following year, 1854.

The Board of Trade returns show that in England,

Ireland, and Scotland, between January 1st, 1850, and June 30th, 1854 (four years and a half), there were 352,658,350 passengers conveyed, 80 killed, and 1,250 injured, or 1 killed in every 4,408,228, and 1 injured in every 282,126. During this period there were fifty-two lines in England, Scotland, and Ireland, on which there were 46,544,390 passengers conveyed without an accident.

It does seem remarkable that these fifty-two lines should in that year have been specially careful to avoid accidents, and that all the servants should have exercised such special care and attention in avoiding them. Was not this happy freedom from accidents on these fifty-two lines due to other favourable causes rather than excess of care?

The Board of Trade returns for 1858, show that on all the railways in the United Kingdom, from 1854 to 1858 inclusive, there were 408 accidents; 640,470,636 passengers conveyed—102 passengers were killed, and 1,966 were injured.

One in every	.	7,907,044	passengers	killed.
"	"	324,454	"	injured.
One victim in every		311,664	"	conveyed.

In the same return it is stated, that during the last eight and a half years about 849,000,000 persons were conveyed, and 142 killed, 2,830 injured from causes beyond their own control, or 1 killed in about every 5,900,000; 1 injured in about every 330,000.

One-sixth of the accidents were traceable to purely accidental circumstances.

If we compare the Board of Trade reports from 1850 to 1863 inclusive, we find that 1,811,376,603 passengers

were conveyed, and during this time 270 were killed, and 5,676 were injured by causes beyond their own control; or 1 killed in every 6,708,802, 1 injured in every 354,395. During these fourteen years there were upwards of 300 passengers killed from their own negligence or want of caution; or, in other words, one in about every six million passengers was killed from his own carelessness.

In this estimate of the proportion of killed and injured, embracing a period of fourteen years, we get much nearer the normal risk than by taking a more limited period; nevertheless, this represents a higher risk than that which really exists. The number of 'season-ticket holders' was 421,446, between the years 1855 and 1863 inclusive, and if we allow that each holder of such a ticket represents 100 passengers (the minimum number of journeys such ticket holders make), and add to this the 1,411,341,293, the number of passengers conveyed on all the lines in the United Kingdom during these nine years, it would be 1,453,485,893 as the representative number of passengers conveyed; out of which number 189 were killed, and 4,107 injured from causes beyond their own control, or *one* killed in every 7,161,301 passengers, and *one* injured in every 353,926, which may be fairly put down as the normal risk to railway passengers.

When we take any given period, and compare it with another, and when all circumstances are as equal as they possibly can be in such a consideration, the results will vary; but the variation is not peculiar to the statistics of passenger accidents, but extends to all cases where a result is brought about by many and varying causes. Even when

causes are not numerous, results of different periods will vary. It has been before said, that during the fourteen years, 1850 to 1863, the average number of passengers killed from their own negligence or want of proper caution, was about *one* in every six millions. The Board of Trade returns show, that between January 1st, 1850, and December 31st, 1858, 179 passengers lost their lives from their own misconduct, and that during these nine years 939,398,349 passengers were conveyed on the various lines in the United Kingdom, showing that, during this period, 1 passenger in every 4,768,524 perished from imprudence.

With these facts before us, we are in a position to compare the safety of English travelling with that in other countries.

In France, from a table published in the *Enquête*, it is shown, that on nine lines, from September 7th, 1835, to December 31st, 1854, 158,399,924 passengers were conveyed: of these, 117 were killed, and 376 injured, or 1 passenger killed in every 1,353,845, and 1 injured in every 421,276. M. Lamé Fleury,* speaking of the security of railway travellers, says that it is much less dangerous than other modes of travelling, and is proved from statistics to involve less risk than is generally considered by the public. He states that, from September 7th, 1835, the date of opening the Saint Etienne line, to December 31st, 1856, 224,345,769 passengers were conveyed; of these 111 were killed, and 402 injured, or 1 killed in every 2,021,133, and 1 injured in every 538,674, and 1 victim in every 437,321. Of the 111 killed, he says 97.

* *Enquête.*

were caused by six accidents, one at de Bellione (1842), one at Frankfort (1846), Onsay (1854), Vangirard, Monet et Peltre (1855); and if these six exceptional accidents were excluded, we have only 1 killed in every 13,000,000 passengers, which he represents as the normal security offered to the public by railway travelling.

But in representing the normal risk incurred by railway travellers from casualties beyond their own control, we must necessarily include all accidents, however exceptional. The result is that, in the aggregate, according to the above calculations, the proportion of passengers killed in England, where 1 life is lost in about 7,000,000 from causes beyond their own control, is less than in France, where it is about 1 in every 2,000,000. As to the number injured in England, it is 1 in about every 300,000, in France 1 in about every 500,000. Thus France appears to be in a better position, as to the number injured, than England; but this is by no means certain, and most likely due to the fact of there being fewer passengers in the trains on the French lines.

If we compare a single year, the relation of the two countries is much the same. Santa* says that, out of 30,646,752 passengers conveyed in 1855, there were 1,439 accidents, 1 killed in every 901,375, and 1 injured in every 329,535 from accidents attributable to the working of the line; from accidents the result of imprudence, 1 passenger killed in every 7,661,688, 1 injured in every 1,915,422, or 1 imprudent person in every 1,532,338 passengers.

* Santa, p. 99.

In the United Kingdom during 1855, there were 98 accidents; of these 21 were to goods trains and 77 to passenger trains, which conveyed 118,625,134 passengers, and during the same year there were 27,964 season-ticket holders. If we calculate each season-ticket holder to make 100 journeys, we have during the same year, 1 passenger killed in every 15,177,691, and 1 injured in every 391,682, and 1 imprudent passenger lost his life in every 6,071,076, representing 8 passengers killed, and 310 injured during the year, from causes beyond their control, and 20 passengers killed from their own misconduct or want of proper caution. These figures contrast very favourably with those of the French, yet we are by no means at the head of all nations. Santa gives some statistics of the Belgian railways, which show that from May 1st, 1835, to December 31st, 1848 (13 years and 8 months), there were 35,447,217 passengers conveyed, and only 4 killed and 18 injured, from causes beyond their own control, whilst 57 were killed and 103 injured by their own imprudence, giving, during the $13\frac{1}{2}$ years, 1 passenger killed in every 8,861,804, or 1 injured in about every 2 millions, 1 killed from his or her own imprudence in every 6,218,372.

In Prussia, from 1851 to 1854, 42,822,976 passengers were conveyed; in 404 accidents, 220 were killed, and 227 injured; the accidents due to the working of the passenger line were only 41, and in these 2 passengers were killed, and 11 injured, or 1 passenger killed in every 21,411,488, 1 injured in every 3,892,998, 1 victim in every 3,294,675.

In America there is a difficulty in getting the statistics, but it is shown by Santa that, in 1855, 1 passenger was killed in every 286,179; 1 passenger was injured in every 90,737.

In 1856 the number of passengers is not shown, but 143 accidents were recorded. In these 195 were killed and 629 injured, or 824 victims, or 5 to every accident! It is not difficult to understand this sad destruction of human life, when we have such accounts as this. 'Lafayette (Indiana) Courier' contained the following: that on October 31st, 1864, the 'Cincinnati express ran into a coal train, both trains being heavily laden: the passenger train consisting of 7 coaches, contained 508 passengers; of these 27 were killed on the spot.' This may furnish *one* explanation of the greater number of passengers injured in some countries than others. In Prussia, and Belgium, trains are not generally so crowded, as in England, France, and America, and we naturally expect more serious results to follow from accidents with crowded trains than with those less so.

If we consider the number of accidents as a test of want of proper caution on the part of the companies, and take this into consideration with the number of passengers conveyed, English railways compare most favourably with all others. Even in Prussia, where the percentage of passengers killed and injured is remarkably favourable, the number of accidents in 4 years was 464, or 116 per annum. In the United Kingdom, during 1855-56-57-58, accidents from all causes, including goods trains, were 309, or 77 per annum; in America, during 1856 there were 143 acci-

dents. These facts show that the number of victims of railway accidents is not in relation to the number of accidents, but is no doubt considerably influenced by the amount of passenger traffic.

Upon the question of number of accidents, it is satisfactory to find that, from the Board of Trade returns, although the passenger traffic in 1855 was 118,625,134, inclusive of season-ticket holders, and during this year there were 98 accidents to passenger and goods trains, that in 1862, while the number of passengers, exclusive of season-ticket holders, was 180,429,071, there were only 65 accidents to passenger and goods trains, an increase of nearly 62 millions of passengers with a third less accidents. In England we have no records, by which such a comparison can be made, as to the relative safety of railway and other modes of travelling; but in France M. Tourneux gives a table of accidents that occurred during the ten years, between 1846-1855, to the two systems of stage coaches in France, *Messageries Impériales* and general imperial stage coaches, 1846-1855.

Messageries Impériales.—Numbers of places occupied 3,679,866, number killed 11, injured 124.

General Stage Coach.—Number of places occupied 3,429,410, number killed 9, injured 114. By the two systems of coaches during the ten years there were 7,109,276 passengers conveyed, 20 killed, and 238 injured, or 1 killed in every 355,463 passengers, and 1 injured in every 29,871, which shows that there was as many killed by the stage-coach travelling, as are injured on the lines in the United Kingdom. In 1857 the general and im-

perial stage coaches were united, and in the 5 years (1856-1860) conveyed 1,868,774 passengers, had 66 accidents, 4 passengers being killed, and 62 injured; or 1 killed in every 467,193, and 1 injured in every 30,141. As M. Lamé Fleury says, it is 'therefore perfectly exact to say that coach travelling will not bear comparison with railway travelling, either as to security, rapidity, or comfort.'

There is yet another way in which we may estimate the mortality from railway accidents, and a sort of crucial test upon the former one; viz. by taking the population of one of our great cities with a large number of hospitals, to which many of the sufferers are brought, where they often die from the injuries they have received, so increasing the death-rate of the city. But it may be objected that very many are killed at the seat of the accident, and as a consequence their deaths are registered in other places than that of which they form a part of the population. On the other hand, it must be admitted that the great majority of those who die from accidents do so after a sufficient lapse of time to allow their removal to such a centre, to obtain better assistance and accommodation for their injuries, and all such deaths would, of necessity, become the subject of a coroner's enquiry, the cause of death be registered in the mortality returned of these cities. For the illustration of this part of the enquiry I am indebted to the kindness of Dr. Farre, who allowed me extracts from the Registrar-General's returns.

Taking the city of London as an example, under the head of deaths registered from railway accidents, and four other causes in 1851-52-53-58-59 and 1860.

	1851	1852	1853	1858	1859	1860
The City of London estimated population . .	2,373,081	2,416,631	2,460,378	2,681,384	2,725,905	2,770,483
Deaths from						
Cancer . .	910	936	1,083	1,142	1,161	1,199
Gout . .	57	60	52	70	77	61
Hanging .	*219	*312	*279	78	87	95
Drowning .	287	353	355	271	319	308
Railway Accidents .	24	25	34	40	23	41
* Includes suffocation from the year 1850 to 1853.						

This table represents deaths resulting from all causes in connection with railways, and in the six years given *only three* were to passengers, and resulting from causes beyond their own control. These were given as *one* from carriage off the rail in 1852, and *one* from the same cause in 1860, and *one* from collision in 1858. If we take the aggregate population of the six years as 15,427,862 we have one death in every 5,142,620, showing that, in a population twice that of the city of London, there is only a chance of one death per annum from railway accidents to such a population! and if we take deaths from all causes connected with railways for the same years, it must be conceded that the hospital returns very considerably increase the death-rate of the district in which they are situated, and represent in the death-rate a much larger population than that of the place in which the hospital is, as very many of those injured at a considerable distance beyond these places are brought for the hospital accommodation it offers, and give a much higher death-rate than that proper for such a population.

	1851	1852	1853	1858	1859	1860
Cancer .	1 in 2,618	1 in 2,581	1 in 2,447	1 in 2,330	1 in 2,347	1 in 2,319
Gout . .	" 41,633	" 49,277	" 50,763	" 38,305	" 36,700	" 45,417
Hanging	" 10,835	" 7,745	" 9,470	" 34,376	" 31,332	" 29,162
Drowning	" 8,275	" 6,845	" 7,437	" 9,894	" 8,545	" 8,995
Railway Accidents	" 98,878	" 96,665	" 72,364	" 67,034	" 118,517	" 67,572

In reviewing these tables, in which the number of registered deaths from railway accidents of all kinds within the city of London are compared with the number of deaths from some of the most rare diseases, as gout and cancer, it will be seen that twice as many died from gout, and 35 times as many from cancer, as were killed by railway accidents, during the six years under consideration. Considering merely the deaths from accidents proper to railway travelling, that is, from collisions and getting off the line, during the same time, in the same population, we have 128 times as many deaths from gout, and 2,165 times as many from cancer. Taking the records of the years 1858, 59, and 60, we find that there were more than twice (2·5) as many deaths from hanging, and eight (8·6) times as many from drowning as resulted from railway casualties within the city, and deaths from collisions, &c., alone, 130 times as many result from hanging, and 449 from drowning.

Again, in comparing the death-rate from the five causes given, it will be seen that, with the exception of cancer, which is considered remarkable for its uniformity, the deaths from railway accidents are more uniform, compared with the population, than any of the other causes of death, the high rate of which is in proportion to the fallibility of human nature.

But deaths from railway accidents of all kinds are, in the popular mind, attributed to gross carelessness, and culpable indifference to the destruction of life.

Now it seems to me, that since human beings are fallible, and human machines are liable to get out of order, there will necessarily be a certain loss of life, connected with railway travelling, that must be considered unavoidable. Even if Boards of Management were in a position to offer Professors of Mathematics a sufficient stipend to induce them to take charge of the points of a railway, I doubt whether the number of accidents would be lessened. Although care and management must do much to lessen their occurrence, it certainly seems that, in spite of every improvement in working lines, the rolling stock, the adoption of telegraphs, and other devices, casualties do and always will occur. Englishmen have a proverbial privilege of grumbling, and few corporations have received more of this than railway boards. It has been the cry, that parsimony, in overworking their pointsmen, &c., has often led to the destruction of human life, or the same result has been brought about from their apathy in availing themselves of suggestions, precautions, and improvements.

At this stage of our enquiry, it may be interesting to examine whether these things are managed much better in France, and how far insufficient remuneration and ineffective service increase railway dangers in England.

The *Enquête* records, that in France, during 1854, there were 70·7 *employés* per myriamètre; in Prussia, during 1855, 72 per myriamètre; in England, during 1854, 75·3 per myriamètre; which shows that the propor-

tion of *employés* per myriamètre is considerably greater in England than in either France or Prussia.

Again; from returns given by Duchesne, (who cannot be considered either a partisan of England or railway companies in general,) we may compare the remuneration given to engine-drivers and stokers, who are, on all hands, considered to be the most important in their relation to the safety of railway travellers; and their condition, in different countries, may be considered typical of the position of the other *employés*. He says, that drivers in Belgium get from 90*l.* to 100*l.* per annum; stokers about 40*l.* In Prussia, drivers about 105*l.*; stokers 65*l.* In America, drivers and stokers about the same as Prussia. In France, drivers vary from 80*l.* to 120*l.*; stokers, from 50*l.* to 60*l.* per annum.

In England drivers vary from 100*l.* to 120*l.*; stokers, from 65*l.* to 80*l.*, besides extras for over-time, extra journeys, overcoats, &c., which are not peculiar to England.

The great speed of railway travelling in England is considered a fertile source of danger. Comparing the speed of English with continental railways, as given by Duchesne, it will be seen that, in France—

The speed of passenger trains is from				32 to 48 kilomètres.
In Belgium	"	"	"	28 " 40 "
From Hanover to Brunswick	"	"	"	32 " 45 "
In Germany	"	"	"	30 " 47 "
In England	"	"	"	28 " 40 "
Mail Trains from 40 to 44.				

The various lines from London —

To Bristol .	69 to 71 kilomètres.	To York .	60½ kilomètres.
„ Exeter .	55 „ 66 „	„ Birmingham .	62 „
„ Dover .	56 „	„ Edinburgh .	54 „
„ Leicester	65 „		

On the Great Western, he says, the speed varies from 26 miles (42 kilomètres), to 43 miles (68 kilomètres) by express trains, including stoppages.

M. Fleury says,* the 'Compagnie du Nord' authorises the maximum rate of passenger trains to be 120 kilomètres (72 miles) per hour; the other branch companies have a lower maximum rate, the lowest rate by mixed trains being from 30 to 40 kilomètres. The stoppages, he says, have a considerable effect on the distance gone over in a given time. The express from Paris to Strasbourg runs the distance in 8 hours 38 minutes, the stoppages occupy 1 hour and 22 minutes. The slow trains on the same journey occupy 12 hours and 35 minutes, and the stoppages 3 hours and 25 minutes.

I think it will be evident, from Duchesne's figures alone, that there is nothing remarkable in the speed of English over other railways, and certainly, even with the quickest express, we cannot be said to exceed that shown by Fleury to be the maximum rate on one of the French lines. The accounts of the various accidents do not show that express trains are by any means more dangerous than slow, as regards the proportion of accidents, either to the number of trains, passengers, or miles run. This comparative immunity from accidents, no doubt, to some extent, is due to the extreme care exercised in working these trains, to the excellent precautionary means adopted, and to the good condition of the rolling stock and permanent way.

It is interesting to compare the number of persons killed and injured with the number of passengers conveyed, also the number of lives lost by the carelessness of passengers themselves in a given number of years, to show how much the public are responsible for. Looking at the fol-

* Enquête, Paris.

lowing table, compiled from the Board of Trade returns from 1855 to 1863, it will be seen that the number of passengers had almost doubled, and season-ticket holders nearly trebled; that the number of killed, in 1855, was 1 in about every 14,800,000, and 1 passenger in every 5,931,256 was killed from want of proper care on his part; in 1863, it was 1 in about every 14,600,000. The proportion injured in 1855 was 1 in 382,661; in 1863 1 in 511,587. And the number of deaths, from want of care on the part of passengers, was, in 1855, 1 in every 5,931,256; in 1863, 1 in every 9,744,527; and 1 passenger in every 9,744,527 lost his life through want of proper caution, or misconduct on his part. The highest mortality, from causes beyond their control, during the 9 years, was in 1861, when 1 passenger in every 3,776,545 was killed, or 1 in every 5,264,276 killed from want of caution; and the lowest in 1859, when there was only 1 killed in every 37,439,323. In these estimates the season-ticket holders were not taken into consideration, which would, if they had been, have put the later years in a relatively better position. From 1855 to 1863 the number of such holders gradually increased, excepting during 1859 and 1860, when there was a falling off, attributed by the 'Lancet' Commission to the public having become acquainted with the injurious consequences of periodical railway travelling. If it was so, the fallacy of the objection must have become evident, as the public proved, by its acts, that the prejudice, if in any degree retained, was not strong enough to deter them from the imagined risk, as this class of travellers increased between 1855 and 1863 more rapidly than ordinary passengers.

SEASON-TICKET HOLDERS.

69

UNITED KINGDOM.

Years	Length of Line. Miles	Number of Passengers	Number of Season-Ticket Holders	Number of Passengers killed from causes beyond their own control		Number of Passengers injured from causes beyond their own control		Number of Passengers killed from their own misconduct or want of caution	
				Killed	1 in every	Injured	1 in every	Killed	1 in every
1855	8,280	118,625,134	27,964	8	14,828,141	310	382,661	20	5,931,256
1856	8,635	129,347,592	32,369	7	18,478,227	281	460,311	20	6,467,379
1857	9,019	139,008,887	37,648	24	5,792,037	646	222,058	24	5,792,037
1858	9,506	152,381,428	52,562	24	6,349,226	418	364,548	27	5,643,766
1859	10,002	149,757,294	49,856	4	37,439,323	371	403,663		
1860	10,433	163,435,678	47,894	36	4,539,879	364	448,999		
1861	10,869	173,721,136	52,079	46	3,776,545	781	222,434	33	5,264,276
1862	11,551	180,429,071	56,656	26	6,935,733	536	336,621	9	20,047,674
1863	12,333	204,635,075	64,391	14	14,616,791	400	511,587	21	9,744,527

The Board of Trade returns show that there were 21 accidents to goods trains in 1855, and 77 to passenger trains; in 1856 the numbers were 12 to 60; in 1857, they were 16 to 22; and in 1858, 12 to 49. It cannot be said, that the diminution in the number of accidents between 1855 and 1858 was due to lessening the hours of labour or diminished tax upon the strength and attention of the *employés*, to whom they are in some degree attributable; or we should have had a gradual diminution, not a fluctuating one, from year to year. As to passengers, it will be seen, that the number killed from all causes, in 1858, was 51 in 77 accidents; in 1855, 28 in 49 accidents. All through the table there is an irregular fluctuation in the numbers, that at once points to there being very many elements in the causation of these accidents, and not one grand one for which the directors are liable. It does, however, throw a most serious responsibility upon railway companies, and it follows that their regulations should be of such a stringent character as to include the minimum of risk and maximum of care; that all such regulations should be most strictly enforced, and any omission followed by prompt and severe punishment. Since the whole pecuniary responsibility of the negligence of their servants devolves upon companies, it must be allowed that Lord Campbell, by his Act, has protected the public against loss from injury resulting from carelessness and given a vast stimulus to directors to do all within their power to increase the safety of railway travelling, for pecuniary reasons, if from no higher motive. The enormous sum of 123,071*l.* was paid for compensation in 1858, and, although not an exceptionally heavy amount,

was equal to 5,127*l.* for each passenger killed, or 294*l.* for every railway victim; surely a sufficient pecuniary inducement for directors to turn their most serious attention to this question. The public, also, is deeply responsible, since, as shown by the above table, the imprudence of travellers is a most serious element in increasing the death-rate, and it is as much their duty to exercise greater vigilance in self-preservation, as it is incumbent upon railway officials to adopt and enforce stringent and efficient regulations.

With the public the effects of accidents, and periodical railway travelling, upon the health, in causing diseases of the nervous system, is an important question. It would be a difficulty of vast extent, to compare the frequency of these diseases at the present time with what they were formerly; and even if we had statistics upon which we could rely, the value of any deductions from them would be almost *nil*. Yet there is one way in which we should expect any such result to show itself, if it did exist, viz., by increasing the death-rate from diseases of this class. To illustrate this point I have had extracted from the Registrar-General's returns, the following table.

Year	Estimated Population of London	Number of Deaths from Diseases of the Nervous System, inclusive of Diseases of the Brain	1 in every of the Popu- lation	Number of Deaths from Diseases of the Brain	1 in every of the Popu- lation
1851	2,373,081	5,938	399	617	3,846
1852	2,416,631	5,878	411	645	3,747
1853	2,460,378	6,526	377	664	3,705
1858	2,681,384	6,571	408	767	3,495
1859	2,725,905	6,557	415	870	3,133
1860	2,770,483	6,749	411	877	3,159

In reviewing this table it will be seen that in 1851, 1 in every 399 of the population of London died from some disease of the nervous system; in 1860, 1 in every 411 from the same cause; while, from diseases of the brain alone, 1 in every 3,846 of the London population died in 1851; and 1 in every 3,159 in 1860.

Taking into consideration the more exact knowledge of nervous diseases during these 9 years, the increase in the death-rate from brain diseases is very small.

The acknowledged effect of the excitement in trade and speculation which was on the increase during this time, and its known tendency to develop diseases of this class, is sufficient to explain the very slight increase; certainly if railway travelling, and secondary effects of railway shocks, had been as productive of these diseases as is popularly supposed, we should have had a much larger increase in a densely populated district like London, with its vast hospital accommodation, of which persons suffering in this way have a natural tendency to avail themselves, these diseases being, in their very nature, chronic. Hence it does not seem unreasonable to conclude, that if railway travelling and secondary results of their accidents stood in relation to diseases of the nervous system as cause and effect, the death-rate during this time would have been swelled to a much greater extent than is indicated by this table.

CHAPTER III.

NATURE OF THE ACCIDENTS AND THE RESULTS OF THE
INJURIES.

IN my enquiry into the result of the injuries to 175 passengers hurt on various lines in the kingdom at periods varying from one to twenty years after the accident, selected for the reported severity of the results, representing about 2,000 victims, and more completely detailed in the Appendix, I have met with 9 deaths. 4 of these were said to have died from the accident; one (case 74*), a male, said to have died twelve months after, 'from the effects of the railway accident.' On enquiring minutely into this I found that, during the last year of his life, he had had frequent attacks of 'delirium tremens' (from which he had suffered before the accident), and the death was registered as—primary cause, 'delirium tremens,' secondary, 'cerebral effusion.'

The second case (case 142) died nine months after the accident—a female, said to have died from the result of the railway accident. She had become dropsical three months after, and died in this state. Her medical attendant informed me that she had suffered for some years from heart-disease left by rheumatism, and the death was registered as—primary cause, 'heart-disease;' secondary, 'dropsy.'

* These numbers refer to the progressive numbers in the Appendix.

The third case (175) was death six weeks after the accident, and said to have resulted from it. An inquest was held upon the body, and a post mortem examination made by an independent medical man, who gave the cause of death 'fatty degeneration of the heart, and passive effusion into the pericardium,' not caused or increased by the accident, and the verdict of the jury was to that effect.

The fourth case (case 31) was a male, said to have died from the effects of the accident six years after. A year after this railway accident he had a severe fall from a horse, by which his back and head were much injured. I am informed by a friend, that he had been dyspeptic and not in very good health previous to the accident—had much anxiety in his business. About eight months after the first injury (time was not very certain) he was found to be suffering from 'diabetes mellitus,' from which he died.

Taking these as representing something like the normal percentage of cases that result fatally from secondary effects (it shows even in severe cases—for the enquiry was specially directed to the permanent results in severe cases, trivial ones not being taken into consideration), we have little more than 2 per cent. resulting fatally, and 0.45 per cent., taking all the cases. I think it may fairly be questioned if any of these deaths were directly or indirectly due to or accelerated by the accident, the first case being one of 'delirium tremens,' caused by his habits, and, having existed before, it could hardly be said that the accident had developed the habits of intemperance in this man. The second case, one of previously existing heart-disease, terminated, as is usual in such

diseases, in dropsy, not having the least relation to the accident except as a sequence.

The third case was pronounced by a jury, after a post mortem examination, not to have been induced or accelerated by the accident.

The fourth case was one of diabetes supervening not upon one accident but two, one the railway accident, and the other the fall from a horse; in both cases the head was cut and bruised, and he was much shaken. By the railway injury he was only prevented from attending to his business for a week, but after the other mishap a much longer period. He was represented to have been dyspeptic, and thought to have been failing in health, before the railway accident. Much engaged in business, the diabetes was not detected until some time afterwards, and although it is a disease that is known to have its origin *sometimes* in nervous disturbances, I do not know of any single case where it has been directly traced to such an accident; nor have I been able to detect the slightest trace of sugar in the urine in any single instance, although I have examined sixty specimens of urine from persons that have been said to have suffered from severe railway shocks. Moreover, in this case there was one other accident, and a probability of its having existed, but not having been detected, previous to either injury.

The remaining five cases (Nos. 44, 95, 98, 120, and 169) were not said to be due in any way to the accident; and enquiry brought out the fact, that (44) died from 'congestion of the lungs' nearly three years afterwards; (95) from 'chronic bronchitis,' five years after the accident;

(98) 'bronchitis,' twelve months after the accident; (120) 'delirium tremens,' after several attacks, three years after the accident; (169) 'phthisis,' eighteen months after the accident. Certainly there is nothing in the histories of these cases or modes of death that can in any way be traced to have resulted from or been in any way a consequence of the previous injury.

In the 175 cases more detailed in the Appendix, into which I have enquired, there were five cases of fracture of the malar bone, one of the nasal process of the superior of the maxillary bone, one of the humerus radius and ulna, three of the clavicle, one of fracture of lower jaw, four of the ribs, three of the femur, seven of tibia and fibula, two of the tibia alone, and ten of the metatarsal bones; making a total of twenty-seven cases with fracture (one of these attended with fracture of the ribs and clavicle (No. 170) is entered under both heads) in 175 cases, which shows that the accidents I have selected for my enquiry must have been severe, although the aggregate number of cases is not so great as might be wished; yet, when these figures are compared with the records of recent railway cases, which I have seen immediately after the accidents, numbering, up to the present, 203, of various degrees of severity, some of them being very trifling in their nature, others very severe, I have only met with one undoubted fracture (and that of the clavicle), two others represented to be fractures of the ribs, which fractures I failed to detect.

In one of these represented fractured ribs *there was not* any crepitus, increased mobility, pain on inspiration or on pressing the side, no cough or emphysema, no subsequent

pleuritis or evidence of lung injury, although four or five ribs were said to be broken. In the other case, it was given in evidence that the eleventh or twelfth rib was fractured, and was distinguished by increased mobility. In this case I could not detect the slightest evidence of fracture, after a most careful examination; this, together with the well-known fact of fracture of a single floating rib being a very rare accident, justifies me in doubting its existence. As the 175 cases enquired into as to their results showed twenty-seven fractures, and the 203 cases of recent accidents, at the most, contained only three fractures, it will be evident that the 175 cases must equal a greater number of victims than that represented, and will also show that my enquiries, as to the permanent results of these accidents did not include trifling cases; on this account they may be fairly assumed to indicate the worst features of these casualties, and point to anything that is peculiar in them.

Fracture of the Malar Bones. — The five cases that I have seen were *three* in males and *two* in females, all attended with cuts and contusions about the head, and general shake or contusion about the body: in none of them could I trace distinct symptoms of injury to the brain. One, a delicate gentleman, was able to attend to his duties in two months; the second did the same in six weeks; the third, a female, in eight weeks; the fourth, in nine weeks; and the fifth, in eight weeks. It was five years after the accident I saw the first case; three years after the second; two years and six months after the third; two years after the fourth; and four years after the

fifth. All of them had remained well after the accident, never even being confined to bed from any cause; none of them having suffered the least symptom of brain disease; and in only one case was there any remaining depression on the side of the face, and that was so trifling, that it was not noticed unless looked for; there was slight deafness in another. The prominence of this bone renders it very liable to receive the force of the concussion in railway accidents, by the person's face being struck against some opposite passenger or part of the carriage; so much so, that we cannot but be astonished that this fracture is not more frequent, but for the well-known fact that blows over this bone less frequently break it, than other bones with which it is articulated. Hamilton * gives a summary of the result of blows (in four cases) with a heavy steel hammer striking the malar bone of a human skull. 'In every instance there was fracture of the superior maxillary bone; *twice* the malar bone was not broken, but in these cases the antrum alone was, and the malar bone very little depressed. In only two cases was the malar bone broken by the first blow. The orbital margin and the orbital plate were fissured *twice*.' These experiments have an important bearing on the cases before us, and point out the necessity of a most careful diagnosis of displacement from fractures, and at the same time lead us to look, in the majority of instances, for the fracture in other bones, as the upper jaw, &c.; to look at the bleeding of the nose as being an indication of the fracture being in the antrum of the upper jaw, or in the ethmoid,

* Fractions and Dislocations. Hamilton, p. 97.

and as such being of minor importance, from the known fact of the rapidity of repair which these bones possess. It has been proved that blows on the malar bone, with or without fracture, rarely produce injury to the brain, and in the five cases where fracture was diagnosed to exist, there was not any symptom of brain injury at the time, and the subsequent favourable progress shows that no secondary consequences of this character arose. Moreover, in the very numerous instances that I have seen, in which blows have been received over this bone, I have only found *one* case of permanent mischief (which will be given more fully hereafter), and where blindness followed the accidents.

Fracture of Nasal Process of Superior Maxillary Bone. — One (case 45), a gentleman aged forty, had a severe blow over the cheek, he was cut on forehead, and much shaken; but returned to his duties in eight weeks. Three years after he had not felt any inconvenience, only been once confined to the house, and that merely for a few days from an attack of influenza, at which time he thought he suffered rather more pain on that side of the forehead upon which the blow was received, but thought he might have done so, if he had not had the blow. This was evidently a case of fracture of the nasal process of the upper jaw from the force of the blow on the malar bone, and further shows that force applied to the malar bone expends itself in fracturing other bones, before any of its effects are exerted upon the brain. The rapid convalescence of these undoubtedly severe injuries to the bones of the face, with other necessary complications, illustrates

the well-known fact, that injuries to the bones of the face are, of all parts of the body, the most rapid in their recovery. Hippocrates thought the nasal bones united in six days. Hamilton has seen it in seven days. Boyer, Cooper, Malgaigne, have noticed that these fractures unite with great rapidity, and the latter author says it is of great importance, in complicated fractures of the upper jaw, that the smallest fragments, however loosely attached, should be carefully retained and replaced, as they will unite with wonderful celerity; a remark of the greatest value, and deserving the utmost attention from surgeons, who frequently meet with injuries to these bones, for the very reason, if no other, that by retaining and replacing portions of imperfectly attached bones we prevent or diminish any subsequent disfigurement of the face, which their removal or imperfect replacement would cause.

Fracture of the Lower Jaw.—One case, a factory operative, aged twenty-three, had fracture of the lower jaw near the centre; much bruised about the head and shaken; was away from work only six weeks. Two years and nine months after, I could not see any deformity or trace of the site of fracture; no loss of sensation. ‘Had never been laid up since, felt pains in his head at times, after having drink,’ his wife said. I could not find any indication of impaired senses or faculties; his general health seemed very good.

The rapidity with which this man recovered is not at all remarkable, for the lower jaw partakes of the characters of the other bones of the face, in rapidly uniting.

Hamilton* has seen a fractured lower jaw immovable on the seventeenth day after the fracture. And as retarded or non-union of this bone is so rare, we seldom have reason to do other than give a favourable prognosis in these cases. It is certainly difficult to see how a blow on this part, even of so severe a degree as to cause fracture, can be followed by any cerebral symptoms, unless the fracture was complicated *at the time* with other deeper and more serious injuries, in which case, the symptoms would be characteristic of the complication; and in accordance with the nature and extent of the complicated injury would our prognosis be modified.

Fracture of the Clavicle.—Three cases. One man resumed his work in six weeks, the second in seven weeks, and subsequently died of apoplexy; the third case was complicated with fractured ribs, and was six months before he could fully resume his duties. But none of them were followed by secondary consequences of any kind, except the last, where there was some stiffness of the left arm of a mechanical kind, but not due to loss of nerve power.

Fracture of the Ribs.—Three cases. I have excluded No. 170, as having been considered under fractured clavicle. The first (No. 68), with three ribs fractured, much shaken and bruised, passed blood by the urethra, had impaired hearing and memory, was able to go about at the end of seven weeks; for two years hearing and memory impaired; four years after the accident said he

* Hamilton on Fractures and Dislocations, p. 116.

‘had not felt any effects for some years.’ Urine normal; general health good.

The third case (No. 161) was represented to me as a frightful case of injury, and had been before a court. All the medical men, seven in number, London and provincial, of the highest standing, (with the exception of one provincial hospital surgeon, of considerable experience,) in their evidence, said the man would be permanently paralytic. His age was 30. Head was much cut and bruised. Was five weeks at the hotel before he could be removed even a short distance home: seventeen weeks before he could move out of bed, or his wounds had healed. Twelve months after he went into the country with crutches; was thought to be permanently paralytic. In two years he could walk without a stick, and there was not any trace of loss of power or wasting in the limbs. He then entered upon a large business, and indulged freely in drink, which he had done at times before the accident. For the last three years he has been more or less in a state of delirium tremens, and had to be constantly watched to prevent his going to excess, as soon as he had recovered from an attack. When I saw him, about seven years after the accident, he had then partly recovered from a severe attack of delirium tremens, and I could not detect any trace of loss of nerve power, other than what was the result of his habits.

These cases, as might be expected, where a number of ribs are fractured in a collision, and complicated with other severe injuries, are amongst the worst. The first had brain symptoms, impaired hearing, &c.; the second,

‘double vision,’ and the third brain and spinal symptoms. Yet, there was not a trace of the injury or secondary disease developed upon them after a lapse of four, six, and seven years respectively. It may be said in the last case, that the giving way to intemperate habits was a result of weakened brain power; but it is only fair to remember that it was a weakness with him before the accident, and about the time he was able to go about; his circumstances much improved by the death of his father; his business responsibility and duties increased; yet it was not until nearly two years afterwards that he quite gave himself up to his vicious habit; which in itself was certainly enough to increase any brain or spinal disease, had any tendency to such remained after the accident.

Fracture of Humerus Radius and Ulna (No. 136).—This was a case of severe injury to the arm, attended with cerebral symptoms, and at the expiration of three months, nothing more was felt than weakness of the arm and impaired pronation and supination. After an interval of six years there had not been any secondary cerebral or spinal consequences. The loss of pronation, &c., was due to imperfect adjustment of the fracture, and not a peculiarity of the accident.

Fracture of the Femur.—Three cases; two in males and one a female, all the result of a violent collision, and attended with other severe contusions. The *first* (71) was in bed eight weeks, and was ten months before he could follow his ordinary employment. The limb was two inches shortened. Three years after the accident he did not feel any consequences other than the shortening of the leg.

Second (88) was in bed ten weeks, no union; readjusted, and was confined for ten weeks more; could walk with a stick at the end of five months; limb three inches shortened. *Third* (119) a female, was at the end of fifteen weeks able to go about; had to wear a high-heeled shoe in consequence of the limb being four inches shorter. She was delivered of a fine healthy child two years and six months after the accident. Three years after had not felt any evil consequences other than the shortening. The peculiarities of these cases were certainly not in subsequent symptoms of injury to any nerve centre, but rather due to the want of proper surgical care in their treatment.

Fracture of Tibia and Fibula.—*Seven cases, all males.* *First* (69) united in ten weeks; in seventeen weeks was able to work. *Second* (71) was four months confined, and fifteen before he could walk well. Seven years after felt a weakness in the knee; no other effects. *Third* (89) was in bed seven weeks; union complete; had to walk with crutches for nine months. Three years after was lame from overlapping of the bones. *Fourth* (92) at the end of ten weeks no union; readjusted; in six weeks union; walked with crutches for twelve months. Three years after no further effects of the injuries. *Fifth* (93) was quite well in nine months and able to work; three years after no effects. *Sixth* (102) union in ten weeks; overlapping and shortening; could not work for eighteen months, and in consequence of the shortening was not able to weave. *Seventh* (107), union in eight weeks; was twelve months before he could work; there was considerable shortening and curving outwards of the limb.

Fracture of Tibia alone.—Two cases. *First* (91), female. Union in eleven weeks; could not work for twelve months; was not able to weave in consequence of the weakness in the leg. Three years after no special effects. *Second* (108) was well in seven months, and has not felt any effects since. The fractures of the lower extremities presented some peculiarities. In twelve cases there were two of retarded union; one of the femur and one of the tibia and fibula. Two cases of shortening, from overriding, of the tibia and fibula, and considerable shortening in all the fractures of the femur; results by no means satisfactory; and it is important to see if the additional injuries contributed to this result. If such was the case, we should have expected to have had it in some of the other cases. It cannot be doubted that the inevitable injury inflicted upon the soft parts at the seat of the fracture, by conveying these persons to their homes, often in the most primitive mode, does not conduce to good recovery. But if this was *the* cause, we should expect a more uniform result in all fractures exposed to its influence.

I am inclined to think that the right explanation is in the badly constructed beds to which these persons are conveyed at their own homes, together with imperfect adjustment of the fractures, and defective surgical appliances. I was not able to trace anything in the mode of union not explainable upon this theory, and it was clearly the case in 102 and 107, two cases of fractured tibia and fibula, resulting in such deformity as to prevent them being able to resume their former employment. Although

all these cases were severe in their nature, independent of the fractures, and attended with considerable contusion and shaking, there was not one case in which there was the least trace of secondary disease in any of the nerve centres; a result that could not have been expected had such been as common as it is popularly considered to be. Even in the 'Profession' this opinion is more commonly entertained than facts and observation justify. Mr. Erichsen has a theory that the force of the collision expends itself in causing the fracture, a theory not founded upon facts; and it is most unsound therefore to conclude, as he would do in these cases, because there was a fracture, therefore nothing else could happen.

Fracture of the Metatarsal Bones.—One case (90), a female; had one toe crushed off; 'was insensible; had concussion of the brain.' In eight weeks was able to return to her work, and three years after the accident did not feel any other injurious effects than the loss of her toe.

In the 175 cases, 110 had blows and cuts on the head; 44 had blows, &c., on the back; 40 had blows, &c., over the shoulders, abdomen, or chest; 5 had blows, &c., on the arms; 40 blows, &c., on the legs; 19 had blows, &c., over the eyes; 73 were said to be bruised and shaken; 7 had teeth loosened or knocked out; 51 were severely shaken; 6 had spitting of blood after the accident; 1 vomited blood; 1 had varicose veins; 26 were more or less insensible; 5 fainted; 4 vomited; 1 had nervous twitchings; 5 were said to have had concussion of the brain; and 4 to have had concussion of the spine; 8 of these cases were

not able perfectly to return to their ordinary employment; one (138) from blindness; one (150) had curvature of the spine following rheumatism and the accident, and could only work six hours a day, owing to weakness; one (94) aged sixty years, had varicose veins, which gave her pain on standing; one (9) aged seventy years, gave up his occupation from age and weakness; three (88, 107, and 102) could not work on account of lameness, caused by badly united fractures; one (150) aged seventy-three years, was in a severe accident, yet no bad result ensued; one (56) had hæmiplegia before the accident; no brain mischief after. No. 7 was in four accidents, No. 66 in three accidents, and No. 139 in five accidents, without any effects remaining at the time of my enquiry. *Two females* were said to have aborted after accidents, but in both cases the surgeons said there was not any ovum seen. Two had varicose veins after the accidents (55); Mr. Startin would not say they were caused by the blow; (94) the patient had them in both legs, her age was 60 years, and I was informed they existed years before the accident. One (132) had *gout*, which he said the accident had caused. Although many of the cases had blows and other injuries to the head, back, and shoulders, and twenty-six were described as being insensible after the accidents, five were said to have had concussion of the brain, four had concussion of the spine, we have only two cases (121 and 138) in which evident permanent mischief followed; one (121) had a severe cut over the left temple, and was insensible for some time; total blindness followed from 'amaurosis,' dependent upon concussion; relieved by cupping, iodide of

potassium and mercury; after being convalescent for some time had hemicrania; removed by iodides and quinine; three years after had an attack of acute mania. When I saw him he looked pale, was nervous, easily excited, and imperfectly nourished; said he had always been so. At the time of the accident he was going with a medical man to consult a surgeon in a neighbouring city; had syphilis before the accident. The right eye was lost; pupil irregular and contracted; atrophic changes in the fundus; left eye good; can attend to the books with it, but a bright light dazzles him. The other case (138) 'had a severe blow on the left side and back of the head; was much shaken and bruised; was insensible for about half an hour; had bleeding from the nose and ears. When he recovered had dimness of vision; prismatic colours seen around objects with the left eye, and considerable pain in the head. The dimness of vision in the left eye diminished under treatment, but returned in about a month. In two months the right eye was affected in the same way; and in four months he lost both eyes. Had severe headaches, tremor, and wasting of the limbs.' When I saw him six years after the accident his general health was good; no paralysis; memory and mental powers good; dilated pupils; atrophic changes in fungus oculi; no perception of light. The first of these cases was, no doubt, inflammation of the dura mater, following concussion, and implicating the eye by extension; and the only question of interest is as to its being due to the accident alone or complicated in its character by a syphilitic taint, the existence of which at the time of the accident I had strong evidence of. The

specific remedies relieving it, and the peculiar pupil, together with the recovery of one eye, point to this as a complication. In the second case there cannot be a doubt, from the immediate insensibility, hæmorrhage from the nose and ears, dimness of vision, the progress of the case from bad to worse, and its melancholy termination, that there was injury to the base of the brain, perhaps, exudation into the optic sheath; yet it is interesting to see the remarkable extent to which this was repaired, and the slight evidence there was of any progressive or subsequently developed disease of the brain, of the spinal cord, or its membranes.

The whole of these cases clearly show, that when there has been any injury to a nerve centre, or its surroundings, we have what pathology would teach us to expect, viz., immediate symptoms of impaired or altered functions of the centre; and when these symptoms are present it is difficult, within a given time, to say to what extent they will progress. Yet there will be either a progression or a retrogression, and not intervals of time without any symptoms, and then these suddenly starting out to end in some serious disease. It is a satisfaction to know that even in many of the severe cases where cerebral and spinal symptoms did exist immediately after the accident, a great majority of them passed away and left no trace of their previous existence in after years. Case 56 is a singular illustration of the slight tendency there is to take on fresh disease in some cases, even where the brain was previously impaired, and *à priori* we should have expected that it would have done so. Nature, in its mechanism, has pro-

tected the nerve centres against injury from external causes in a remarkable way. It was an acknowledged surgical fact, before railway cases were so frequently the subject of litigation, that blows and contusions of the back were not so apt to be followed by such serious results as is now popularly supposed to be the case. Shaw,* in his article on 'Injuries of the Back,' gives a very sufficient anatomical reason why the medulla spinalis is not prone to suffer from external injuries. Speaking of sprains of the back, the same author says:† 'Very early after the accident considerable tumefaction takes place, accompanied with signs of inflammation;' and that experience does not warrant us in entertaining fears of chronic inflammation extending to the deep parts of the spine. 'Even where serious symptoms have followed sprains,' he says, 'the proportion of these cases is so small that in ordinary practice we are entitled to give a favourable prognosis.'

In the cases I have appended, 110 had blows on the head; 44 on the back; 73 were bruised and shaken; 5 were said to have had concussion of the brain, and 4 concussion of the spine; and 26 were more or less insensible after the accidents; yet there was not a case followed by serious permanent spinal impairment. In case No. 161, where undoubted spinal mischief did follow the accident, it passed off in spite of his habits, confirming what Shaw says, that the prognosis may generally be favourable. My experience in recent cases strongly supports the correctness of Shaw's opinion.

* System of Surgery by Holmes, vol. vii. p. 197 et seq.

† Ibid. p. 20.

Speaking of the term 'concussion of the spinal cord,'* Shaw says: 'to assign a definite signification to the word is difficult. It would appear to indicate that a vibration passed through the medulla spinalis, the result of a corresponding vibration in the spine like that which takes place in the brain when the skull rings from a blow; and that effects were produced by that concussion in the cord similar to those with which we are acquainted as symptoms of the concussion in the brain. But the analogy does not in any single particular hold good. The anatomical relations of the cord to the vertebral canal are totally different from that between the brain and the cranium.'

He also (p. 241) says: 'Another cause of paraplegia, temporary or partial, independent of fracture or extravasation of blood, yet succeeding an injury to the back, has been described. It is a change in the structure of the cord, supposed to consist of a slight disintegration of the minute tissues such as might be produced by a vibration passing through its substance.'

'This disorganisation, according to that hypothesis, is not palpable to the senses; and the truth of the view is beyond our power of either affirming or denying. Yet experience would lead us to conjecture that violent and abrupt flexion of a particular part of the spine, especially if accompanied with a sudden jerk or jar, would have the effect of bending the cord beyond its normal limits and breaking up its structure to a greater or less degree; not

* System of Surgery by Holmes, vol. vii. p. 238.

so much, however, as to preclude the possibility of its recovering its soundness, and having its functions restored after they have been lost.'

Erichsen, in the introduction to his work (the first that has appeared in the English language on railway injuries) 'On Railway and other Injuries of the Nervous System,' p. 2, says: 'These concussions of the spine and spinal cord not unfrequently occur in the ordinary accidents of civil life, but from none more frequently or with greater severity than in those which are sustained by passengers who have been subjected to the violent shock of a railway collision.' In explanation of this statement he says (p. 9): 'It must, however, be obvious to you all, that in no ordinary accident *can* the shock be so great as in those that occur on railways [the italics are mine]. The rapidity of the movement, the momentum of the person injured, the suddenness of its arrest, the helplessness of the sufferers, and the natural perturbation of the mind that must disturb the bravest, are all circumstances that of a necessity greatly increase the severity of the resulting injury to the nervous system, and that justly cause the cases to be considered as somewhat exceptional from ordinary accidents.' Now, it may fairly be questioned if such are the peculiar conditions of these accidents; at the same time it must be freely admitted that they do exist *sometimes*, as they do with all other accidents; but railway accidents do not always occur when trains are moving at the full speed; the momentum of the person is in proportion, *cæteris paribus*, to the speed; the suddenness of the arrest is not always a peculiarity in railway accidents, certainly not

so much so as when a person is thrown against a wall, or upon the ground from a great height; because, collisions *do not* invariably happen to a train running into a fixed body, and not unfrequently the suddenness of the arrest is considerably lessened by the attempts made to pull up before coming into contact with the other train or body on the line; and the helplessness of the sufferers is not greater than when a private carriage is thrown down an embankment, or runs into some fixed body. The perturbation of the mind does not often occur before the accident, since passengers shut up in carriages rarely know that an accident is about to happen, and the maximum injury is generally inflicted before they are aware of what has taken place.

Speaking of the 'railway spine,' he says (p. 10): 'Do not for a moment suppose that these injuries are peculiar to and are solely occasioned by accidents that *may occur* on railways. There never was a greater error. It is an error begot in egotism and matured by indolence and self-complacency.' Then he quotes an expression of Sir A. Cooper's, 'That his experience, extensive as it had been, was only as a bucket of water out of the great ocean of surgical knowledge,' and further quotes from Bacon a remark applicable to surgeons: 'They be the best physicians which being learned, incline to the traditions of experience, or being empirics, incline to methods of learning.' Judicious and wise aphorisms as these are, Mr. Erichsen, in his work, utterly disregards them. He begins by saying that concussion of the spine, &c., occurs more frequently and with greater severity to railway

passengers than when produced by other causes. I presume this to be the result of his own observations, as I fail to find in his work the experience of any other person or records of such cases from any other source. Surely this is not inclining to the traditions of experience, or the methods of learning usual in writers on special subjects, or of men holding eminent positions, unless the solitary case of Dr. Muty's is considered ample traditionary evidence. But why not quote from the same volume ('Med. Observ. and Injuries,' p. 160), a case by Mr. Knox, which also occurred 100 years ago, where symptoms of loss of power followed *immediately* upon an injury to the back, in which case there were *not* at the least two elements in the causation of the disease, as in Dr. Muty's case, for 'Count de Lordat,' not only had an injury to the head and neck, but was exposed to considerable cold and fatigue for some time after the accident; and it is quite as fair to conclude from the distance of time between the accident and the development of the symptoms, that the cold and fatigue 'caused the spinal meningitis,' and that it was located in the cervical region as a consequence of his previous injury, and by no means necessarily typical of the concussion of the spine. We may now consider Mr. Erichsen's definition (p. 18), or 'explanation of concussion of the spine,' which he says is 'generally adopted by surgeons and indicates a certain state of the spinal cord occasioned by external violence; a state that is independent of and usually but not necessarily, uncomplicated with any obvious lesion of the vertebral column, such as its fracture or dislocation, a condition that is supposed

to depend upon a shake or jar received by the cord, in consequence of which its internal organic structure *may* be more or less deranged and by which its functions are *certainly greatly* disturbed.' I think an explanation like this cannot be accepted, even on the authority of Mr. Erichsen; for, whilst we admit the difficulty of a correct definition, we cannot allow explanations wanting in exactness to pass unquestioned. Surgeons generally consider that if the internal organic structure of a part be deranged, the functions of that part will be disturbed, and that there will be evidences (in symptoms) of this derangement, and not, as we must infer from Mr. Erichsen's explanation, which propounds a most novel pathology, that the intimate organic structure of the spinal column (*id est*, the cord) may (*or may not*) be more or less deranged, by which the functions are *certainly greatly* disturbed.

Mr. Erichsen quotes 2 cases from Sir A. Cooper, 2 from Mayo, 2 from Sir C. Bell, 2 from Boyer, 13 from Olliver, and records *three* of his own; in only one of Sir C. Bell's cases does he say, the symptoms 'developed themselves slowly, after an interval of some months,' p. 20. Then follows a correct array of the 'primary symptoms of concussion of the cord,' and 'secondary symptoms of severe concussion of the spine,' which 'are usually those of the development of inflammation of the meninges and the cord itself,' but he does not say that *primary* symptoms are ever absent, and secondary ones present, as some of the cases and subsequent conclusions would lead us to infer was the fact; nor does he record a single case of his

own elucidating the pathology of such railway injuries, and only quotes two in the experience of Mr. Gore; one without any early history, 'when paralytic symptoms showed themselves *within a year after the accident*, and where death ensued from the remote effects of concussion of the spine from railway collision' (p. 113 *et seq.*). Another also from Mr. Gore, ending in phthisis two years and a half after the injury, having been preceded by symptoms of spinal irritation. Although he has said that in 'no ordinary accident *can* the shock be so great as in those that occur on railways,' he does not furnish us with any pathological observations, from his private or hospital experience which he would surely have seen, had these results followed as frequently as his work would lead us to expect they do.

Under the head of *Concussion of the spine from slight injuries*, Mr. Erichsen gives *two* cases resulting from railway accidents, and *two* from other causes: in all, the symptoms appeared within a very short time, and in those from railway accidents, even in the brief account given, the symptoms were evidently cerebral in the first instance. He does not cite any hospital cases, nor are the symptoms stated in those following railway accidents such as he lays down to be characteristic of concussion of the spine; nor does my experience in 175 cases, nor my further *observation* for several years in recent accidents, furnish me with any of the character related by Mr. Erichsen, with rigid spine, &c. I have seen several patients after a railway casualty, where medical testimony and the pecuniary results have had some resemblance to

those he records, but certainly none with the symptoms he attaches so much importance to; this may be from my experience being far more limited than his, but if so, I think we are entitled to expect that his book *should* contain the result and details of such experience. We ought to have had, in the first book on railway surgery, either more cases or a summary of those upon which the writer's experience was founded; surely it is not enough to give one or two records as typical of a certain lesion, when that lesion is much disputed, or we may fall into the error the writer cautions us against, and say in Mr. Erichsen's large experience he saw it, and not trouble ourselves with the study of the books and opinions of other surgeons of equally large experience, but from implicit faith, indolence, or some other cause, rest content with the 'ipse dixit' of one writer.

Under the head of '*Concussion of the spine from general shock*,' Mr. Erichsen relates *three* examples. In *one*, his knowledge of it extends to seven months after the accident; *in the second*, no account is furnished of the patient's state after the trial, which was fourteen months after the accident; the *third* was under treatment and improving fifteen months afterwards.

Twists, sprains, and wrenches of the spine. — Mr. Erichsen says (p. 80), 'the great prospective danger is the possibility of the inflammation developed in the fibrous structures of the column, extending to the meninges of the cord;' and he gives *one* railway case where a lady was buried under the *débris*, after a railway accident, and had her head forcibly twisted and neck bent some time before

she could be extricated ; in this respect not differing in any way from what would have happened had she been laid in the same position from any other cause.

The whole of Mr. Erichsen's reported experience consists of six cases ; surely a most *sad* and *limited* one it is, if these represent the character and number of them ; and if not, how much better and more satisfactory would it have been if Mr. Erichsen had given us an average of the cases that have been followed by such results ? It is somewhat remarkable, that under the head of Twists, Sprains, &c., it is not even mentioned that a very great majority of such injuries arise in ordinary mishaps ; and, in my experience, such consequences from railway accidents are not generally followed by any serious result whatever. It is, however, admitted on all hands, that spinal injuries are only serious in consequence of their being followed by inflammation of the spinal cord or its membranes, or hæmorrhage into the spinal column, even including fractures and dislocations of the spine. The liability to this result is, by some medical men, thought to be very common ; and by others to be extremely rare. It is this variation of opinion that constitutes the great difference in medical men's conclusions as to the result of railway accidents ; and, as too often happens, deductions are drawn from individual experience which must be limited and vary considerably ; but, at all events, such deductions are very likely to be the more fallacious in proportion to the small number of cases observed, the less care with which these are observed, and the presence of any tendency in the mind of the observer to select especially the cases that support any preconceived

hypothesis, whether this hypothesis be formed upon hearsay evidence or by prematurely theorising upon a limited experience. As spinal injuries (like all others), from railway accidents are serious in proportion to the spinal cord or its membranes being primarily or secondarily affected, it will become our duty to look to the literature of these diseases, to see how far the examples prove or disprove the development of them from such accidents. In looking over Reeves,* I find he has recorded and quoted from English, French, German, and Italian medical works, 238 cases of spinal disease.

Fifty-three were cases of acute inflammation of the membranes of the cord, or 'acute spinal meningitis;' of these 6 only resulted from injuries. 17 were cases of chronic inflammation of the membranes of the cord, or 'chronic spinal meningitis;' none attributed to injury. 14 were cases of inflammation of the substance of the cord, or acute softening of the cord, 'acute myelitis;' 2 of these from injuries. 34 were cases of induration of the cord, or 'chronic myelitis,' 1 only from injury. 62 were cases of chronic softening of the cord, or 'chronic myelitis;' 9 resulting from injuries. 58 were cases of apoplexy of the cord, and 15 of these followed injuries to the spine; or a total of 35 cases connected with injuries to the spine, or about 15 per cent of the whole, and not one recorded as primarily or secondarily depending upon railway accidents. The same author says, 'the exciting cause in spinal meningitis, with or without implicating the cord, is most frequently exposure to cold, and was so in 8 out

* On Diseases of the Spinal Cord and its Membranes. Lond. 1858.

of 29 cases; 5 had been liable to rheumatism, and 6 had received blows or sprains on the back.' At p. 8 he says cerebro-spinal meningitis is liable to be epidemic, and quotes Boyle and others. Out of 21 cases recorded, only 2 were connected with injuries, and 1 of these had tubercle in the lungs at the same time. As to the termination of these cases, he says 12 implicated the 'arachnoid,' and 8 recovered (the longest under treatment was 48 days); 1 became chronic, and 1 fatal in a child a few days old; 11 implicated the 'pia mater;' all these were fatal by the 20th day. 7 implicated the membranes and cord, and were all fatal by the 26th day. 20 implicated the membranes of the cord and brain, and were all fatal by the 21st day, with the exception of 3, which lasted several weeks.

Chronic inflammation of the membranes of the cord, he says (p. 47), 'is frequently a sequel of acute, may be chronic from the first, but is apt to become acute, or sub-acute, and rarely ends fatally except in the upper part of the cord.'

Acute inflammation of the substance of the cord.—'Acute myelitis' is caused by exposure to cold, suppression of menstrual discharge, sleeping in damp beds, after fractures of the spine, concussions, or effusions of blood. Reeves gives two cases following injuries; in both these special symptoms immediately followed the accidents. Both were fatal.

Induration of the cord.—In the majority (Reeves says), no cause could be assigned. Cold, exposure to wet, residing in damp houses or marshy districts, and injuries to the spine, seem to act sometimes as the exciting causes.

The duration of this disease in adults varied from fifteen months to thirty years.

Chronic softening of the cord, or 'chronic myelitis.'—

Of the 62 cases the exciting cause in 8 of them was caries of the vertebræ.

In 7 cases from direct or indirect injuries to the spine.

„ 2	„	exostosis.
„ 2	„	cancer of the vertebræ.
„ 2	„	concussion of the spine.
„ 4	„	exposure to cold.
„ 3	„	fatigue.
„ 2	„	intemperance.

In a great majority of the cases collected no cause was assigned; mental anxiety, chronic rheumatism, lumbago, and gout are said to have preceded them.

Apoplexy of the cord in 58 cases; of these 15 were excited by falls or blows on the spine; 19 occurred during other diseases, as syphilis, rheumatism, gout, &c. Railways had been in existence a quarter of a century before this book was written, and as it records the cases from English, French, German, and Italian writers, we should have expected some evidence of railway accidents, had they been as fertile in causing spinal disease as Mr. Erichsen indicates. In searching other writers on this subject, previous to the last ten years, railway accidents are rarely or never mentioned; and even in later editions of *some* surgical writers, we do not find railway accidents adduced as a cause of concussion of the spine. This silence of early writers, and many recent ones, cannot be due to these cases having escaped their attention, because, when they do exist,

they are attended with such symptoms and followed by such results that the most indifferent observer would not pass them over. If Mr. Erichsen's typical cases do actually represent what may be expected from railway injuries, and if we ignore the 'traditions of experience,' we must still question the correctness of such a type of cases being the rule; and whilst we admit that they are peculiarly exceptional, not only in their variety, but in the character and sequence of symptoms, we doubt their fully and truly representing such kinds of accidents as they are intended to do, and by no means according with the acknowledged pathognomonic symptoms of spinal or cerebro-spinal meningitis, or myelitis, either acute or chronic. It may be said that these injuries, unlike others (yet Mr. Erichsen says 'they only differ in their severity'), do not follow the ordinary course of such diseases when ideopathic, and therefore their symptoms are peculiar. It is somewhat curious to notice how these convenient hypotheses have, of late years, arisen in courts of law. I remember, some years ago, hearing it stated in evidence 'that railway accidents, even of very slight character, give rise to concussion of the brain.' At this time similar injuries to the spine were rarely heard of; and not unfrequently the hypothetical concussion of the brain was found wanting when tried by a cross-examination; and soon after, to get over this difficulty, a minor kind of concussion was described as 'succession,' which represented all kinds of symptoms in general but nothing in particular. And even a still further refinement of diagnosis I have heard described under 'disturbed polarity of the brain particles,' with its

characteristic symptoms; which I must plead guilty to never being able to comprehend. The spine is *now*, what the cranium *was* formerly, a fashion! and is going through some of the same phases. We have '*concussion of the spinal column*,' '*concussion of the spinal marrow*,' '*contortion of the spine*' with and without injury to the ligaments and other fibrous tissues, &c., all of which may have symptoms indicating their existence, but if not present, are to be looked for at some remote period; and, whether present or absent, do not interfere with the diagnosis of the injury when associated with a railway collision! All these injuries are said to produce serious results, in giving rise to one or other of the varieties of inflammation of the membranes, or of the spinal cord itself; yet it is said to be too much to expect that any of the special symptoms of these diseases shall be present before the diagnosis is given. No doubt the loose way in which medical terms are sometimes used, and the imperfectness with which they are understood out of the profession, often leads to a false construction being put upon a diagnosis; and for this reason it behoves all medical men to use only such terms as have a strict meaning, and as exactly as possible indicate a certain pathological change, which may vary in degree, and not loosely speak of 'shock' to this or 'concussion' of that, unless some *exact* meaning is attached to each term, never using them as a ready way of giving expression to what may be a false conclusion drawn from careless observations. Conflicting medical opinions, independently of anything like partisanship, must always be met with, as they are in all inexact sciences, for it has been said 'no two minds

can draw exactly the same conclusions from the same facts.' How much less likely, then, are they to do so when certain facts are wanting, or some are estimated of greater value by one than by another, which is commonly the case in medical observations. Hence railway cases require to be observed with greater care than ordinary injuries, since there is an element in them not found in ordinary accidents, namely, the question of compensation. It would be wrong to say that this always imparts a special character to them, but my experience is, that only two out of 280 persons injured, more or less severely, did not claim and obtain compensation; therefore, to neglect or ignore this consideration is likely to lead to error in estimating the value of certain symptoms. I must say with Casper, 'It would be a display of great *naïveté*, and still greater want of personal experience in these matters, to say that a simulation ought never to be presupposed.' *

I had intended, in the outset of my enquiry, to have compared the value of certain symptoms in the differential diagnosis of these injuries, and obtained certain facts in each case with this purport; but for want of time, and fear of giving anything like an appearance of prejudice in favour of any peculiar notions, I have thought it better for the present not to enter into the differential diagnosis of injuries or their simulations.

Mr. Erichsen, with a meagerness not alone characteristic of this part of his book, has most briefly and imperfectly entered upon the differential diagnosis of *spinal concussion* from 'the secondary consequences of *cerebral*

* Forensic Med. vol. iv. p. 79, N.S.S.

concussion,' and resolves them into two positive symptoms, 'pain and rigidity of the spine,' and one negative one, 'the absence of any distinct lesion about the head.' Surely these are not sufficient data for a rational diagnosis, where simulation or exaggeration has to be taken into account.

From *rheumatism*, he says, the diagnosis may not always be easy, 'especially in the earlier stages of the disease;' but he relies upon the 'history of the case, concomitant articular inflammation and superabundance of lithates in the urine,' all of which may exist in spinal meningitis following chronic rheumatism, or may not be at all times by any means sufficiently manifest to be pathognomonic of the origin of the meningitis; a disease which, when once developed, from whatever cause, has not anything peculiar in its symptoms, and whether from injury or rheumatism, may or may not be attended with cerebral complications giving to the case peculiar symptoms indicative of this complication, and may be equally slow and gradual in its progress. For *hysteria* to be confounded with concussion of the spine, followed by meningo-myelitis, Mr. Erichsen thinks it 'extraordinary that so great an error of diagnosis could so easily be made,' because 'hysteria is a disease rather of young excitable women, runs no definite or progressive course, assumes no permanency of action,' &c. Mr. Erichsen must have seen men of hysterical habits, also females that have been victims of railway accidents; also seen cases of 'hysterical spine,' that was much in fashion at one time, before the 'railway spine' was known; and, as

Dr. Watson says, 'persons not *up to these cases* might confound them with a real spinal disease; in hysteria, as well as railway injury to the spine, the symptoms of a *subjective character* may have a great similarity, sufficiently so to confuse a loose observer, that was not inclined to allow any question of simulation to weigh with him in his diagnosis; or who gave full credence and value to all "subjective symptoms," even in the absence of *objective* ones, upon which we can alone rely if we wish to arrive at a "pathological diagnosis" rather than an "empirical" one.' It is a well-known fact, that hysteria does show itself at times in males as well as in females, and that men 'active in mind, accustomed to self-control, addicted to business, and healthy in body,' do occasionally, after severe emotional excitement, become affected with a train of symptoms known as 'hysterical,' and simulating those attendant upon diseases of the '*nerve-centres*,' but wanting many of the important objective symptoms. When we know that such results do follow upon emotional excitement, it is not too much to expect and look for such a train of symptoms in persons, however strong in body or mind, when so many emotions are liable to be inordinately excited at the time or after a railway accident. It is somewhat singular that Mr. Erichsen has not mentioned these, or recorded that he has or has not seen one case of simulated spinal disease following a railway accident; and still more remarkable that he should not have thought it necessary, in the differential diagnosis, to caution his pupils against this, and instruct them how to diagnose feigned spinal disease from real,

more especially as these cases so frequently become medico-legal questions.

Under the head '*Prognosis*' (p. 128), Mr. Erichsen couples *concussion of the spine* with '*meningo-myelitis*,' as if the latter was an essential to the former—an impression that is only reasonable if we admit that the author has given a fair report of all such cases, and drawn conclusions from all, and not from the *few extreme cases that he has recorded*. But experience, and the evidence of other observers, even of more than 'twenty-five years' hospital experience,' does not show that meningitis, or meningo-myelitis, is by any means a necessary sequence to concussion of the spine, even in a strictly pathological sense. Perfect recovery not unfrequently takes place where symptoms of spinal meningitis have followed injury, as is well known and amply illustrated by the experience and writings of many able surgeons, as well as by the cases here quoted and recorded; yet Mr. Erichsen is very silent on this subject.

I do not wish to warp everything to a favourable termination, or ignore the fact that most serious consequences have arisen from railway accidents; or that concussion of the spine may be followed by very serious mischief. To what extent this may be the case within a given time, it is impossible to say; nor do I wish to merit the charge of seeing these cases through '*railway spectacles*,' which are said to be only just sufficiently '*diaphanous*' to admit light to protect the interests of the companies. I would say, in defence of '*railway doctors*,' that there are amongst us men with whose probity and accurate knowledge,

judges, barristers, jurymen, and especially the medical men, ought to be satisfied. And it will hardly be suggested that companies, in selecting their medical advisers, seek for the absence of these qualities as a recommendation; for however favourable their own medical man may look upon a case, it is well known that his opinion is regarded with suspicion, and slighted or ignored by the claimants for compensation, therefore of no value in *forcing settlements*; but only valuable to them in proportion to its exactness and its confirmation by experience, which alone induces them to rely upon the statements of their medical officers; and if existing injuries were systematically ignored, the subsequent knowledge which is too frequently brought to light by litigation, would soon correct such an evil by destroying all confidence in their opinions.

That railway medical men do frequently differ in opinion with those having charge of cases, is an undoubted fact, and one which, too, frequently redounds to their credit; because, in their view of these cases, where a motive for simulation is nearly always present, loose statements of facts and subjective symptoms are critically examined, and the history of the case, the nature and severity of the accident, are always elements of consideration. It is not enough to be told that a person was in a railway collision and that certain subjective symptoms have followed it, therefore he assuredly suffered from the accident; whereas the medical man called in (and not unfrequently some other one than the ordinary medical attendant is selected,) too often relies upon loose statements and subjective symptoms.

I have known one person alleged to have been injured in three separate accidents, for each having a different surgeon; without the distance or difficulty of obtaining the former one being the true explanation. Then he informed the attendant that he had been in a railway accident, suffered certain injuries, and complained of certain symptoms—too frequently, in my experience, the *point d'appui* of the diagnosis, treatment, and prognosis. Too often the medical man says it matters little to him what is the nature of the accident, for all ‘railway accidents are severe,’ therefore he does not inquire into the speed of the train or probable force of the collision; and if there be evidence, by cut or contusion, of the injuries complained of, the first fact (the accident) and its severity are undoubted. In the absence of cuts or bruises as evidences of these injuries, the symptoms complained of are accepted as proof of the injury and evidence of the accident, full credence being given to all statements and symptoms without question, and on the theory that medical men are ‘bound to accept the statements of patients consulting them as perfectly true.’ Nothing can be more inexact or illogical than such enquiry and conclusion. I have known a person in a railway accident escape uninjured, afterwards have a fight, get two black eyes, go home, lay up, send for a surgeon, give such an account as above represented; the black eyes were accepted as evidence of injury without further enquiry by the surgeon, and the case treated as one of concussion of the brain, until the ‘railway doctor’ gave the true history, and confirmed it by indisputable evidence. I have also known fever, syphilis, and other

diseases—I have even known the statement of a person ‘having had his hip dislocated, walked some hundred yards with it in that state, and then reduced it himself,’ being accepted by a medical man as a truthful representation of the character and consequences of a railway injury. With such facts and experience, which are more or less within the knowledge of every railway medical man, there is no difficulty in understanding why they are frequently obliged to differ in opinion with those in attendance. I maintain that it is the duty of all medical men, whether ‘railway doctors’ or not, to be perfectly satisfied that a patient of whom we may be called to give an opinion, is both able and willing to give an accurate account of his injuries and symptoms before accepting them as true; and even then to require ‘moral evidence and objective symptoms,’ before concluding that every ‘sequence is a consequence.’

‘Railway doctors’ are forced, by their experience, to attach very considerable importance to ‘moral evidence;’ it becomes their duty, without assuming the character of a partisan, to be satisfied: 1st, that the accident, by its nature, was sufficient to produce an injury; 2nd, that the injury complained of was such as *might* have been caused by the accident; 3rd, that the immediate symptoms *are* characteristic of the alleged injury; 4th, that the remote symptoms are such as might follow as consequences of the former; 5th, that these symptoms are not due to any previous or intercurrent disease; 6th, that where the evidence of 1st, 2nd, and 3rd is imperfect or wanting, the 4th may be fairly doubted, unless certain ‘objective symp-

toms,' that are pathognomonic of a pathological change, are present. In the importance attached to the absence of 'objective symptoms,' and the presence of 'subjective symptoms' alone, railway medical men are, to their credit, somewhat peculiar. I have known, in *courts of law*, the correct use of the *prism*, *ophthalmoscope*, and *thermometer*, characterised as 'railway dodges' of no value, set up to screen their employers from a just liability; 'whilst an alleged *dizzy feeling*, *impaired memory*, and *spinal pains*, *without any character*, (stated to exist by the victim's medical man, upon the strength of his faith in his patient,) to be received as positive evidence of *most serious injury*. It is our misfortune, and not our meet justice, as 'railway doctors,' to have our facts and conclusions ignored, as theories set up to lessen the damages, but not to be believed. We too frequently hear from the bench and bar, that the 'railway doctor's' opinion *was so and so*, but, on the other hand, the opinion of his medical attendant is very different; and not unfrequently the inference is put to the jury that the opinion of the 'railway doctor' is imperfect or untrue and biassed by his appointment. Surely, if we are to be charged with being so susceptible of corruption, it might be said of all medical men that the wishes of their employers must give a character to their opinions, whether victims or boards of directors; and if so, the acknowledged value given to opinions of men that have had large experience, and made a special study of certain facts, ought to be accorded to 'railway doctors;' at least, to the extent of allowing them to be able to observe facts

and draw correct conclusions with the same degree of accuracy as other medical men, that have had far fewer facts to observe and employed a less critical mode of observation.

In conclusion, I must say, that when I first became connected with a railway company, my early impressions, and the teachings of my masters, led me strongly to the belief that railway casualties were generally, if not always, of the most serious character; and, acting upon this impression, I made certain suggestions as to the desirability of having means for conveyance ready at different parts of the line, to lessen these supposed consequences as much as possible. My suggestions were acted upon, but hitherto, after several years, they have not been required. My gradually increasing experience first made me doubt the correctness of my foregone conclusions. Finding, as I did, *employés* and passengers alike receiving injuries of various kinds and degrees, recovering without developing the train of symptoms I had expected, I concluded that the most proper and most satisfactory mode of arriving at an approach to the true nature of these accidents, would be to enquire into the state of a number of cases, at considerable intervals of time after the accidents. With this end in view, and a desire to ascertain the truth, I began my enquiry into the cases recorded in the Appendix. The labour, although considerable, has been much lightened by the kind and cordial assistance I have received from many professional friends, and the frank courtesy with which several railway companies have facilitated my obtaining the required information.

APPENDIX.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
1	25	Goods guard.	July 1860	Jumping from train when in motion.	July 1862, 2 years after.	Fracture of clavicle; much shaken.
2	29	Guard to fast trains.	Jan. 1859	Engine ran off the line; a front van was thrown over.	July 1862, 3 years after.	Cut over the right eye; bruised all over, and severely on the right hip.
3	30	Guard to a fast train.	1860	Axle of engine broke in an express train; was in the last van when axle-tree broke; ran off the line.	Aug. 1862, 2 years after.	Thrown with his back against the van; struck by a piece of the roof, which was broken in; had a piece of skin knocked off his back in the lumbar region; much shaken; was thrown on his face; the stiffness and soreness remained for 7 days, then went off; has never ailed anything since.
4	38	Fruit dealer.	Jan. 1859	Collision.	Jan. 7, 1863, 4 years after.	Cut over the eye; insensible; bruised about the legs; was much shaken; followed by rheumatic pains, continuing for 4 weeks. Had rheumatic fever twice since the accident.
5	30	Traveller.	Oct. 1851	Collision.	Jan. 7, 1863, 12 years after.	Very much shaken; insensible for some time.
6	30	Merchant.	Jan. 1859	Collision.	June 1863, 4 years after.	Much shaken and bruised.

Duration of Sickness	Present State	Able to follow Employ- ment	Para- lysis	Mental Aberra- tion	Special Senses affected
6 weeks.	In very good health : free from pain on change of weather.	Yes.	None.	None.	None.
Off duty 6 weeks.	Thinks he does not sleep as well as before ; eats meat suppers. 'Never been off duty since, except recently, from inflammation of side. Feels as strong as ever he did.'	Yes.	None.	None.	None.
Went to his work next day ; never felt any ef- fects. Did platform duty next day ; waited 14 days for general enquiry ; then went to his usual work.	Is in very good health, robust, eats and sleeps well, and feels as strong as ever.	Yes.	None.	None.	None.
Attended to business in 10 days.	Jan. 7, 1863. Says at times he feels pains in the side on a change of weather ; is a rheumatic subject, and has an occupation which exposes him to wet.	Yes.	None.	None.	None.
3 weeks.	Jan. 1863. Now engaged in brick-making ; has never been ill since the accident.	Yes.	None.	None.	None.
3 months away from business.	June 1863. Looks well ; functions healthy ; says, when he reads a scientific book, or is excited in business, feels pains in the head ; has never been laid up since the accident.	Yes.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
7	40	Guard to a fast train.	1859	Collisions in 4 accidents.	Sept. 1862, 3 years after.	Thrown from the break with his stomach against the edge of the van; side and arm bruised. Two months after his train ran into a goods waggon; shaken. Two months after, another shake. November 1859, train ran into a coal waggon and engine; was thrown with his head against the van; blow severe; much bruised all over.
8	22	Factory worker	1861	Collision.	June 12, 1863, 2 years after.	In third-class carriage; head severely hit against the back of the carriage; no wounds; 'worked 9 days; then laid up for 3 weeks.' Said 'he had concussion of the brain.'
9	79	Pattern card maker.	1856	Collision.	Nov. 1863, 7 years after.	A 'severe blow on the back, causing concussion of the spine;' has not worked for the last 3 years; before that could do a little; is not able to walk more than 200 yards from debility and difficult breathing, caused by chronic bronchitis.
10	44	Pawn-broker.	1855	Collision.	Jan. 1863, 8 years after.	Carriage smashed to pieces; much shaken, the chest and stomach trampled upon; no cuts or fractures; spat blood, and passed it by stool; confined for three months.
11	40	Factory worker, female.	1855	Collision.	June 1863.	Carriage smashed, trampled upon and crushed (third-class); was insensible for some hours; had 'concussion of the brain and spine;' went to work in 3 weeks.

Duration of Sickness	Present State	Able to follow Employment	Paralysis	Mental Aberration	Special Senses affected
Went to his work next day. Went to his work as usual. Went to his work as usual. Went to his work as usual.	June 1863. Feels no effect; has excellent health; never been off work, except a year ago, for 2 weeks, when he had scarlatina.	Yes.	None.	None.	None.
3 weeks; then followed his work; has done so ever since.	Looks well; 'feels better since the accident than before.'	Yes.	None.	None.	None.
6 weeks under medical care.	For his age looks well: has bronchitis, which troubles him much; complains of debility.	Was for 4 years after accident, then gave up from debility.	None.	None.	None.
3 months.	Jan. 13, 1863. Attends to his business; has pains on pressure in his stomach or after food; has not parted with blood for 8 or 9 months, but feels weaker since the accident.	Yes.	None.	None.	None.
3 weeks.	June 15, 1863. Still feels weakly; cannot work as well as before; is sickly; has aching pains in the back.	Yes.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
12	60	Agent.	1853 and 1858	Collision. Collision.	June 1863	Had 'concussion of the brain, and bruised about the head. Was insensible for some hours;' was 12 months before he could attend much to his duties, and 2 years before he felt perfectly able to do so.
13	50	Cap-maker.	1860	Collision.	June 13, 1863, 3 years after.	Head much bruised and swollen; 'insensible for some hours; laid up for 14 weeks; had pain in the head and back; paralysis of right arm.'
14	42	Chemist.	Nov. 1861	Collision.	June 16, 1863, 2 years after.	1st Class. Cut his head, and fainted from loss of blood; shaken: no other injury.
15	33	Married female. House duties.	May 1861	Collision.	June 1863, 2 years after.	Left side of head bruised; arm bruised; eye much swollen; 'lamed on the back; fainted;' was in 3rd month of pregnancy; confined to bed for 3 weeks.
16	34	Printer	1861	Collision.	June 16, 1863, 2 years after.	1st Class. Maxillary process of right malar bone fractured; eye much swollen and ecchymosed; bleeding from the nose; fainted from loss of blood; right hip much bruised; was said to have spinal concussion.

Duration of Sickness	Present State	Able to follow Employ- ment	Para- lysis	Mental Aberra- tion	Special Senses affected
Attended to his duties.	June 15, 1863. Seems very well; no wasting of muscles, no evident impairment of senses; thinks his memory not so good as before the accident, but his duties tax it much. I had business transactions with him, but did not find it defective.	Yes.	None.	None.	None.
12 months.					
2 years.					
4 months.	Looks well, and attends to an active business; walks well; says when the right arm is shaken it pains his head and back; pulse equal on both sides; no wasting after the accident.	Yes.	None.	None.	None.
10 days.	Looks very well; no effect, except that he feels nervous in fast trains, and has aching pain sometimes in the head on pressure of the hat.	Yes.	None.	None.	None.
3 weeks.	Did not abort; had a natural labour at full time; still feels dizzy when things disagree with her; has pain in her back at times; no loss of power; has had another child; labour natural.	Yes.	None.	None.	None.
2 days in bed; 3 weeks con- fined; 8 weeks before he could attend to his duties.	Looks well; face natural; if he walks 4 or 5 miles he still feels a little aching in the right hip; otherwise no effect.	Yes.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
17	47	Agent	1860	Collision.	June 1863, 3 years after.	Was bruised about the head, and shaken.
18	46	House duties.	1860	Collision.	Ditto.	Much shaken.
19	16	At school.	1860	Collision.	Ditto.	Shaken and bruised.
20	46	Tailor.	Nov. 1861 Previous accident 1855	Collision.	June 17, 1863, 2 years after.	For a few days felt no effects; then pains in the head and along the spine, of a rheumatic character, came on; could only walk with a stick; went to the seaside; was 4 months before he could walk without a stick; for 3 weeks his sleep was disturbed.
21	50	Draper	1857	Collision.	June 1863, 6 years after.	'Stunned and insensible;' leg thrown under and against the seat, causing abrasion of skin; 'had paralysis of throat, could hardly swallow his saliva; stiff neck; had a crop of boils a year after.'
22	23	Warehouse woman	May 1861	Collision.	June 1863, 2 years after.	Thrown against her <i>vis-à-vis</i> ; had a black eye, a swollen face, leg bruised; much shaken; fainted, and was insensible.

Duration of Sickness	Present State	Able to follow Employment	Paralysis	Mental Aberration	Special Senses affected
3 or 4 days.	Feels no effect.	Yes.	None.	None.	None.
2 days.	Ditto.	Yes.	None.	None.	None.
3 days.	Ditto.	Yes.	None.	None.	None.
4 months before he could properly attend to his business.	June 17, 1863. Looks well, eats well; 'cannot walk any distance without fatigue or having to rest;' attends to his business; feels more excitable and depressed after than usual; 'cannot tell the fine flavour of a cigar as he could before;' was in a collision 6 years before; did not feel any effect.	Yes.	None.	None.	None.
Wound was 2 months in healing; was 3 months from business.	June 1863. Looks well; lives freely; feels no effect from the leg; is in robust health now.	Yes.	None.	None.	None.
14 days from work.	Does not feel any effect of the accident.	Yes.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
23	34	Draper	Nov. 1860	Collision.	Jan. 1863, 3 years after.	Front teeth knocked out, upper lip cut, hip bruised, much shaken.
24	59	Mid-wife.	In 1859	Collision.	Jan. 1863, 4 years after.	Was much bruised on the right side of the head and right side of abdomen; was insensible, had retention of urine, vomiting; could not walk for pain in her right leg.
25	46	Piano-forte maker	Mar. 1860	Collision.	June 1863, 3 years after.	Thrown against division of second-class carriage; front teeth driven back, face and cheek much swollen and black; pushed the teeth back into their places; felt mazy for a few days, then it passed off.
26	33	Merchant.	Nov. 1861	Collision.	June 1863, 2 years after.	Severe cut over left eye, much swollen and ecchymosed; much shaken; felt mazy, slept badly; laid up for 6 weeks. (First class.)
27	56	Merchant.	1843	Train ran off the line in France.	June 1863 20 years after.	Top of the head struck severely against the top of first class carriage; thinks he can feel the depression now; no cut; much shaken; a week after did not feel any effect.
28	23	Clerk.	1860	Collision.	June 1863, 3 years after.	1st Class. Thrown forwards speechless; bruised face, cut head, left side of cheek bruised; much shaken; was on his wedding tour.

Duration of Sickness	Present State	Able to follow Employment	Paralysis	Mental Aberration	Special Senses affected
14 days.	Jan. 20, 1863. Front teeth replaced by artificial ones; hip pains him a little in wet weather; has no other effect.	Yes.	None.	None.	None.
6 months.	Jan. 20, 1863. She looks well, says that she has not been able to attend to a midwifery case since, from pain in walking. Afterwards, I found she did attend these cases, and was out at a labour this morning.	Yes.	None.	None.	None.
6 days.	June 1863. Is very well; has been ever since; does not feel the slightest effect from the accident.	Yes.	None.	None.	None.
6 weeks.	June 1863. Has perfectly recovered; feels no effect, except when he has headache; thinks it is worse over the left eye; feels as well as ever he did.	Yes.	None.	None.	None.
6 days.	June 22, 1863. Does not, nor has he ever felt anything from the accident.	Yes.	None.	None.	None.
7 days.	June 22, 1863. Does not feel the slightest effect, nor has he done since a week after the accident.	Yes.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
29	24	Clerk.	1861	Collision.	June 1863, 2 years after.	1st Class. Had 'concussion of spine,' and much shaken; pain on walking; sleepless; highly nervous; laid up for 5 weeks.
30	47	House duties, Female	Aug. 1861	Carriage turned over.	June 1863, 2 years after.	Was knocked and bruised all over; her back, spine, and chest were trampled upon; had severe pain in lumbar region, retention of urine for 2 days; sleeps badly; was in bed 1 month.
31	45	Merchant.	1857	Collision.	June 1863, 6 years after.	Lip cut, eye swollen, head much bruised; generally shaken; was off business a week. A year afterwards had a fall from his horse; head and back much injured; never recovered his strength, and died 3 years after from diabetes; his medical attendant thinks he had been out of health and dyspeptic before the railway accident.
32	43	Eating house keeper	1857	Collision.	June 1863, 6 years after.	2nd Class. Was asleep at the time; thrown with his head against the top of the carriage, and in the recoil hit his sacrum; no cut or bruise. Was irritated and excited; walked on to the station; had two glasses of brandy; went on to Lytham; was delirious; threatened to jump out of the window. 'Delirium tremens;' slept badly for 4 months, during which time he was at the coast; came back stouter; for 3 years after was nervous and irritable.

Duration of Sickness	Present State	Able to follow Employ- ment	Para- lysis	Mental Aberra- tion	Special Senses affected
5 weeks.	June 1863. Feels slight pains in the lumbar and sacral regions when he takes cold; in other respects well.	Yes.	None.	None.	None.
1 month.	Feels no effect from the accident: has sacral pains and is weakly; has severe leucorrhœa.	Yes.	None.	None.	None.
7 days.	Died of diabetes 3 years after the accident.				
4 months.	Looks well, stout, and robust; says that the only effect he feels, is that noises excite him.	Yes.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
33	39	Tea merchant.	1860	Collision.	July 1863, 3 years after.	Thrown against his <i>vis-à-vis</i> ; nose bruised; eyes blackened; much shaken.
34	36	Beer-house keeper and warehouseman.	1861	Collision.	July 1863, 2 years after.	A drum that was on his knees (in 2nd class carriage) was driven against his chest and abdomen; was laid up for a week, then went to his employment as a warehouseman.
35	39	Tea merchant.	1859	Collision.	July 1863, 4 years after.	2nd Class. Both legs below the patella were struck against the opposite seat, thrown with his head against the compartment, and in the recoil struck his back against the seat; both knees much swollen, back bruised, and much shaken; a crop of boils came out; on 4th day went to the seaside.
36	22	Female, house duties	Nov. 1860	Collision.	July 1863, 3 years after.	1st class carriage. Much shaken; struck over the head; insensible for several minutes; no sickness.
37	65	Female, laundress.	Aug. 1860	Collision.	Aug. 1863, 3 years after.	3rd Class. Back part of head severely struck, eye cut, face much contused; back struck; much shaken, and fainted.

Duration of Sickness	Present State	Able to follow Employment	Paralysis	Mental Aberration	Special Senses affected
7 days.	Looks well ; does not feel any effect, nor has he done.	Yes.	None.	None.	None.
7 days,	Had several attacks of rheumatic fever before the accident, which left him with mitral disease; six months ago was laid up with dropsy and palpitation; thinks his dropsy was the result of the accident.	Yes.	None.	None.	None.
2 months.	Was a year before he could properly attend to business from nervousness and debility. July 1863, looks well; there is some bursal swelling over the knees; his medical men thought he would have a stiff knee; walks well; no stiffness.	Yes.	None.	None.	None.
Not laid up at all.	Felt headache and slept badly for 10 days; has never felt any effect since (wife of case 28); thinks her husband was worse hurt than she; he referred me to her as being more severely hurt.	Yes.	None.	None.	None.
3 weeks, from pain in the back.	Still feels soreness in her back, and nervous about railway travelling; can attend to her duties, and seems healthy.	Yes.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
38	60	Female, living with her son.	Aug. 1860	Collision.	June 1863, 3 years after.	3rd Class. Forehead cut severely; eyes and face swollen and ecchymosed; back of head much knocked; generally shaken and bruised; was sick, and fainted.
39	42	Female, house duties.	Oct. 1859	Collision.	July 1863, 4 years after.	3rd Class. Thrown forward against the partition; head, side and back struck with the recoil, followed by abortion; ovum not seen; has not menstruated since the accident, but feels 'the pains at this time.' She had rheumatic fever at 14, which left her with palpitation; this has not increased since the accident.
40	49	Merchant.	July 1860	Collision.	June 1863, 3 years after.	Was in the middle of the train in a 3rd class carriage with a 1st class ticket, in consequence of the heat; struck on back and side; mouth cut, face bruised by opposite passenger; severely struck on top of the head; insensible for some time; vomited, then fainted.
41	45	Manager.	Nov. 1861	Collision.	June 1863, 2½ years after.	1st Class. Severe blow on the head, lip cut, face much swollen and ecchymosed; much shaken; no sickness or fainting.

Duration of Sickness	Present State	Able to follow Employment	Paralysis	Mental Aberration	Special Senses affected
3 weeks, from nervousness.	June 1863. Can walk well; has never followed her business — stay-making — since, but says it is because it was given up; can attend to house duties, but thinks her memory is not as good as it formerly was, can remember what she reads.	Yes.	None.	None.	None.
2 months, from the abortion.	July 1863. 'Does not feel any effect from the accident, except weakness at the bottom of the back; at the menstrual period sleep was much broken for a few weeks, but is now quite sound.'	Yes.	None.	None.	None.
At home 4 days, then came to his business for a short time; in 3 weeks was quite able to attend to his business.	June 1863. Feels no effect from the accident except pain in the head near the seat of the injury, but 'hardly thinks it connected with the accident, as he can always trace it to some stomach derangement.'	Yes.	None.	None.	None.
Laid up a week.	June 1863. 'Sleeps badly from feeling unsettled; feels more nervous in travelling, but no other effect; has had excellent health since.'	Yes.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries.
42	22	Clerk.	Dec. 1860	Collision.	June 1863, 2½ years after.	2nd Class. Hip cut; forehead cut; three teeth loosened; chest and bowels much bruised; stunned for some minutes after the accident.
43	56	Female, wife of a publican.	July 1860	Collision.	June 29, 1863, 3 years after.	2nd Class. Right malar bone fractured and depressed; head much bruised; ecchymosed, and swollen; side bruised and ecchymosed; had bleeding from the mouth and nose; insensible for some time.
44	60	Moulder and beer-house keeper	July 1860	Collision.	June 27, 1863, 3 years after.	3rd Class. Much shaken; no cuts; head bruised.
45	41	Carver and gilder.	July 1860	Collision.	July 1863, 3 years after.	1st Class. Severe blow on the face; nasal process of superior maxillary bone broken; black eye; lost a large quantity of blood from the nose; back of the head bruised; knees contused.
46	38	Female, wife of 45.	July 1860	Collision.	July 1863, 3 years after.	1st Class. Both knees much bruised; prostrate with the shock; severe bruises on the back.
47	21	Female, factory operative.	Aug. 1860	Carriage turned over.	July 1863, 3 years after.	3rd Class. Crushed by passengers and debris; on arms, chest, and back; arms, back, and sides black; was insensible for some hours; spat up blood for 2 weeks; off work for 3 weeks.

Duration of Sickness	Present State	Able to follow Employ- ment	Para- lysis	Mental Aberra- tion	Special Senses affected
Went to his work after 3 weeks.	June 1863. Feels no ef- fect; has had good health, and is in every respect as well as before.	Yes.	None.	None.	None.
Laid up 2 months.	June 1863. Feels no effect, except the depres- sion of the malar bone, and 'thinks her right ear is slightly affected.'	Yes.	None.	None.	None.
1 month.	June 1863. Had not felt any effect from the in- jury. Died six weeks ago from congestion of the lungs.	Yes, was for 2 years.	None.	None.	None.
3 weeks.	July 1863. Felt worst the day after; in four days the pain in the head was gone; but was confined from the blackness of his face and eyes; no effect remaining.	Yes.	None.	None.	None.
1 month.	July 1863. Pains con- tinued in the legs and back for about a month; since that has not felt any effect from the accident.	Yes.	None.	None.	None.
3 weeks.	July 1864. Has always been feeble and liable to palpitations; is anemic, has attacks of palpitation about once a week, lasting a few minutes, coming on after muscular exertion or emotions; seems feeble, and is badly nourished.	Yes, since 3 weeks after the ac- cident.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
48	21	Operative.	Aug. 1860	Carriage turned over.	July 1863, 3 years after.	3rd Class. Head very much bruised; a severe cut over the left eye; very much shaken.
49	51	Operative.	Aug. 1860	Collision.	July 1863, 3 years after.	3rd Class. Was asleep at the time, with his head resting upon his umbrella; was thrown forward with his stomach and head against the rail, knees against the opposite seat; back and dorsal region much bruised and black; suffered pain in the back for 3 weeks; could not lie upon it; was away from work 3 days only.
50	45	Yarn agent.	Oct. 1859	Collision.	July 1863, 4 years after.	2nd Class. Was thrown against a female opposite, and against the partition; cut over left eye, chest and abdomen bruised; confined for 3 weeks from pains in his head; slept badly a month; no vomiting, cough, or hæmorrhage.
51	48	Cabinet maker	March 1861	Collision at the station.	July 1863, 2 years after.	3rd Class. Much shaken, and cut over the eyes; had pains in the head for a week.
52	42	Factory operative.	March 1861	Collision at the station.	July 1863, 2 years after.	3rd Class. Leg severely struck against the seat, causing a wound on the shin; his chest hit the partition with great force; leg well in 3 weeks.

Duration of Sickness	Present State	Able to follow Employment	Paralysis	Mental Aberration	Special Senses affected
2 weeks.	July 1863. Feels no effect; has never been ill since the accident.	Yes.	None.	None.	None.
3 days.	July 1863. Does not feel any effect from the accident; has never been ill since.	Yes.	None.	None.	None.
3 weeks.	July 1863. Complains of periodical headache ever since; he is very stout and of full habit; has had lumbago several times; lives freely; never been laid up since the accident.	Yes.	None.	None.	None.
Laid up 4 days.	July 1863. Has never felt any effect from the accident since the first week.	Yes.	None.	None.	None.
3 weeks.	He is in good health; never ill since the accident; no pain in the leg, no cough; thinks he has more pain in the chest than he had before the accident, but it never prevents him from working; no abnormal sounds.	Yes.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
53	32	Dress-maker	Aug. 1860	Collision, and getting off the line.	July 1863, 3 years after.	3rd Class. Severely cut about the chest, abdomen, and head; insensible for several days; suffered from pains in the head and chest (did not spit blood) for 2 months; gradually recovered.
54	19	Female, weaver	May 1861	Collision.	July 1863, 2 years after.	3rd Class. Head severely struck, 'had a fatty tumour?' on scalp, both eyes blackened, cut over the left eye; for 2 months confined from pains in the head and debility; the fatty tumour was 12 months in going away.
55	50	Manager of bank.	Jan. 1859	Carriage run off line and down embankment.	July 1863, 4 years after.	2nd Class. A scalp wound; left arm much bruised, left gluteal region bruised; after a week the pain in the hip increased, and was very severe on motion; head and arm well in 3 weeks; leg got worse, an ulcer formed; treated by 'clamp' for varicose veins, and the leg got well; has varicose veins on the other leg.
56	50	Calico printer	March 1860	Carriage off the line and upset	July 1863, 3 years after.	2nd Class. Two years before had suffered from slight hemiplegia and impaired speech, which left him in 6 months. In the accident, head was cut, much shaken and bruised; front teeth knocked out.
57	48	Female, house duties.	March 1860	Carriage off the line and upset.	July 1863, 3 years after.	2nd Class. Much shaken, and bruised about the head.

Duration of Sickness	Present State	Able to follow Employment	Paralysis	Mental Aberration	Special Senses affected
2 months.	July 1863. Went to her work at the end of 3 months; never ill after the accident; general health good.	Yes.	None.	None.	None.
2 months.	July 1863. The only thing she feels is occasionally a pricking sensation over the seat of the tumour; does not interfere with her work; has not been ill since; looks healthy and florid.	Yes.	None.	None.	None.
2 years after.	July 1863. Was 2 years confined to his room from the leg; did attend to his duties in his room; after 3 weeks felt nothing from the head or arm, and when the varicose veins were cured his leg soon got well, and has not since felt the slightest result from the accident; can walk well.	Yes.	None.	None.	None.
1 week.	In 10 days did not feel any bad effects, except the loss of his teeth, nor has he done since.	Yes.	None.	None.	None.
4 days.	Has not felt the least effect from the accident.	Yes.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
58	6	Female	March 1860	Carriage off the line and upset.	July 1863, 3 years after	2nd Class. Much bruised about the head and chest; played about as usual in a week, and did not complain.
59	43	Merchant.	1859	Collision.	Aug. 1863, 4 years after.	Was shaken, and bruised about the head; laid up for 3 days; felt sick and nervous, slept badly for a month, and his nervousness did not leave him till he slept better.
60	26	Female, house duties.	Oct. 1862	Collision.	Aug. 1863, 1 year after.	3rd Class. Had not menstruated for 7 weeks; was frequently irregular; had a blow on the side and stomach, was sick; aborted 2 days after; ovum not seen; the discharge ceased the fourth day; was hysterical.
61	40	Curator.	July 1860	Collision.	July 1863, 3 years after.	2nd Class. Was thrown against the seat; both knees severely contused; the 'groin' was struck against the seat, causing great swelling of scrotum and testicle; much shaken, was 2 months before he could walk well, and had slight difficulty in passing urine.
62	35	Female, house duties.	July 1860	Collision.	July 1863, 3 years after.	2nd Class. Face cut; head much contused and swollen; shaken, insensible for a short time; in 10 days was able to attend to her duties.
63	12	Boy at school	July 1860	Collision.	July 1863, 3 years after.	Much shaken, and bruised on chest, head, and sides.

Duration of Sickness	Present State	Able to follow Employment	Paralysis	Mental Aberration	Special Senses affected
Did not play for 3 or 4 days.	Never complained since, and has had good health.	Plays as usual.	None.	None.	None.
4 days.	August 1863. 'Does not feel anything that he can attribute to the accident.'	Yes.	None.	None.	None.
14 days.	Eleven months after the accident was delivered of a fine healthy child; does not feel any result 'except the sound of the railway whistle in the <i>right ear</i> causing pain, even when no train is near.'	Yes.	None.	None.	None.
2 months.	July 1863. Does not feel the slightest effect from the accident, except some relaxation of scrotum, for which he has to wear a suspensory bandage.	Yes.	None.	None.	None.
10 days.	July 1863. Has not felt any effect.	Yes.	None.	None.	None.
Went to school in a week.	July 1863. Felt nothing since; has had good health.	Yes.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
64	13	Boy at school	July 1860	Collision.	July 1863, 3 years after.	Much shaken and bruised about the head.
65	46	Merchant.	1861	Collision.	July 1863, 2 years after.	2nd Class. Head severely cut and struck; much swollen; was insensible for an hour; felt worse at night; slept badly.
66	38	Traveller.	May 1859	Collision.	July 1863, 4 years after.	2nd Class. Has been in two accidents before; did not feel any effect from them; in this, his left leg and foot were cut and bruised, head cut, swollen, and contused; much shaken.
67	43	Carver	July 1858	Collision.	July 1863, 5 years after.	3rd Class carriage. Right leg cut and bruised in popliteal space; left leg much bruised and ecchymosed to the hip; back much bruised; generally much shaken.
68	49	Attorney's clerk.	June 1859	Running off the line from axle-tree breaking	July 1863, 4 years after.	2nd Class. 'Side much bruised; 3 ribs broken; ecchymosis from hip to shoulder; kidneys injured, and passed blood in large quantities by the urethra for 2 days; generally shaken; hearing and memory for names impaired.'
69	36	Workman.	Feb. 1862	Collision.	July 1863, 1 year after.	3rd Class. Fractured tibia and fibula near the ankle joint; much shaken.

Duration of Sickness	Present State	Able to follow Employ- ment	Para- lysis	Mental Aberra- tion	Special Senses affected
Went to school in a week.	July 1863. Felt no- thing since; has had good health.	Yes.	None.	None.	None.
3 weeks off duty, and 2 months before he felt all right.	July 1863. He felt ner- vous twitchings, which troubled him for 5 or 6 weeks, and when he began to sleep better these left him; now does not feel any effect from the accident.	Yes.	None.	None.	None.
4 weeks.	July 1863. Does not feel any effect; his leg and general health are as good as ever.	Yes.	None.	None.	None.
4 weeks in bed, had pain in his leg for 4 months.	July 14, 1863. Does not feel anything from the ac- cident, 'except a grating in the right knee in wet wea- ther.'	Yes.	None.	None.	None.
7 weeks. Did not find his hearing and memory per- fect for 2 years.	July 15, 1863. Does not feel any effect, nor has he done for several years. Urine healthy, senses per- fect, muscular power nor- mal.	Yes.	None.	None.	None.
10 weeks.	Felt pain in the leg during wet weather, for 6 months; now strong as ever; no pain or lameness.	Yes.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
70	45	Potato dealer.	Feb. 1860	Ran off the line, axle broken.	July 16, 1863, 2½ years after.	3rd Class. Much bruised over the back, loins, and arms; generally shaken; giddy and confused.
71	67	Grocer	Aug. 1856	Collision.	July 1863, 7 years after.	Fracture of tibia and fibula; contused knee; much swollen and bruised generally.
72	36	Merchant.	May 1858	Collision.	Aug. 1863, 5 years after.	3rd Class. Head and back bruised; was senseless for an hour, afterwards suffered from giddiness and frontal headache.
73	34	Joiner.	Sep. 1860	Collision.	Aug. 1863, 3 years after.	3rd Class. Severely crushed about chest, head, and abdomen by the débris; leg much contused; vomited blood, felt dizzy and nervous.
74	27	Mason.	Sep. 1860	Collision.	Aug. 1863, 3 years after.	3rd Class. Clavicle fracture; much contused, and generally shaken.
75	61	Factory hand.	Sep. 1860	Collision.	Aug. 1863, 3 years after.	3rd Class. Crushed by the débris; chest contused; face much bruised and cut; left eye much contused; spat blood for 3 days; was giddy and nervous; slept badly for 14 days.
76	22	White-smith	Sep. 1860	Collision.	July 1863, 3 years after.	3rd Class. Chest much bruised; head cut and bruised; was stunned; spat blood for 2 days.

Duration of Sickness	Present State	Able to follow Employment	Paralysis	Mental Aberration	Special Senses affected
7 weeks.	Feels in perfect health, but at times giddy, thinks it due to his stomach.	Yes.	None.	None.	None.
4 months. Required a crutch or stick for 15 months.	Feels well in every respect, except a weakness in the knee.	Yes.	None.	None.	None.
4 weeks. Felt the headache for 10 months.	Feels in perfect health, and never was better than he has been since his headache left him.	Yes.	None.	None.	None.
4 weeks. After that for 2 months felt weak.	Health good; does not feel anything of the injury now.	Yes.	None.	None.	None.
7 weeks off work.	Died 12 months after the accident in a fit, reported apoplexy; had been drinking hard; was a stout, robust man.	Yes, for a time.	None.	None.	None.
2 months, then did not work for 3 months.	Does not feel any effect except a slight pain under the right breast when he works hard; this passes off if he rests a few minutes. Looks remarkably healthy, and younger than he is.	Yes.	None.	None.	None.
4 weeks.	Does not feel anything except after severe fatigue; then he has pain in the chest, which passes off with rest.	Yes.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
77	46	Hawker.	Sep. 1860	Collision.	July 1863, 3 years after.	3rd Class. Was generally much shaken; chest and head much bruised.
78	40	Butcher.	June 1859	Collision.	July 20, 1863, 4 years after.	3rd Class. Right malar bone broken; face cut; bleeding from mouth and nose; much shaken; pains in the head.
79	37	Dress-maker.	July 1860	Collision.	Aug. 1863, 3 years after.	2nd Class. Face and head much bruised; back bruised in the recoil.
80	58	Calico-printer	Sep. 1858	Collision.	Aug. 1863, 5 years after.	1st Class. Left malar bone broken; no cuts; face and side of head much swollen; left arm, side, and leg bruised and ecchymosed; much shaken.
81	28	Factory worker	Sep. 1860	Collision.	July 1863, 3 years after.	3rd Class. Contused leg; sprained ankle; much shaken.
82	20	House duties, female.	Sep. 1860	Collision.	July 1863, 3 years after.	3rd Class. Lacerated forehead; much shaken.

Duration of Sickness	Present State	Able to follow Employment	Paralysis	Mental Aberration	Special Senses affected
4 weeks.	Attended to all his duties from a month after the accident, and does not feel any effect.	Yes.	None.	None.	None.
4 weeks. Felt pains in the head for 5 weeks longer.	Had rheumatism a year ago; feels dizzy sometimes, and thinks his memory is not as good as before the accident, but cannot say in what way.	Yes.	None.	Except imperfect memory, which is rather doubtful.	None.
3 weeks.	At the end of three weeks felt as well as usual, now suffers from shooting pains in the face; has decayed teeth, and thinks these cause the pain.	Yes.	None.	None.	None.
4 weeks. Then went to business, felt excited, and rested another month.	Feels nothing more than a tingling and twitching of the left cheek and upper lip; has excellent health.	Yes.	None.	None.	None.
3 weeks.	Does not feel any effect from the accident.	Yes.	None.	None.	None.
10 days off work.	Married since the accident; had one child; feels slight frontal headache at times, but has never been off work, except from confinement.	Yes.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
83	30	Dress-maker.	July 1860	Collision.	Aug. 1863, 3 years after.	3rd Class. Head bruised and shaken by being thrown against opposite passenger; back and hips much bruised in the recoil; had pain and difficulty in walking; ecchymosis, which left in 14 days.
84	50	Stonemason.	Sept. 1860	Collision.	Aug. 1863, 3 years after.	3rd Class. Face cut and bruised; much shaken; left ankle contused and sprained.
85	33	Factory worker	Sept. 1860	Collision.	July 1863, 3 years after.	3rd Class. Crushed by the debris; had both knees doubled up and contused. Back much bruised.
86	30	Overlooker.	Sept. 1860	Collision.	Sept. 1863, 3 years after.	Ankle much contused; leg bruised; much shaken generally.
87	29	Labourer.	Sept. 1860	Collision.	July 1863, 3 years after.	Fractured femur, upper third; much shaken.
88	42	Inn-keeper.	Sept. 1860	Collision.	July 1863, 3 years after.	Fracture of femur, middle third; much shaken; severely contused in several parts.

Duration of Sickness	Present State	Able to follow Employ- ment	Para- lysis	Mental Aberra- tion	Special Senses affected
10 days.	Does not feel the least result from the accident.	Yes.	None.	None.	None.
10 weeks.	Feels slight pain if he extends his ankle: is in good health, and does not feel any other effect.	Yes.	None.	None.	None.
7 weeks in bed, and 7 months off work.	For 4 months had great pain in the back on bending, and knees were stiff. All that he feels now is an occasional pain in the back after heavy work.	Yes.	None.	None.	None.
4 weeks.	Can walk as well as ever; feels slight pain on flexion of the ankle.	Yes.	None.	None.	None.
In bed 8 weeks: off work 10 months.	Leg 2 inches shortened; considerable overlapping of bone; does not feel any other effect than the shortening of the leg, which causes him to walk lame.	Yes.	None.	None.	None.
In bed 11 weeks; no union; put up again; united in about 10 weeks; could walk with a stick in 5 months.	Leg 3 inches shortened; walks with a stick; does not feel anything but the inconvenience of the shortening.	Not able to do his former work in consequence of the lameness caused by the shortening, and having to use a stick.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Accident	Nature of Injuries
89	28	Factory worker	Sept. 1860	Collision.	Sept. 1863, 3 years after.	Fracture of left tibia and fibula; much crushed; right thigh scalded.
90	24	Female, weaver	Sept. 1860	Collision.	July 1863, 3 years after.	One toe crushed off; 3 others fractured; 'much shaken; insensible for an hour from concussion of brain.'
91	30	Female, weaver	Sept. 1860	Collision.	July 1863, 3 years after.	Fracture of left tibia; lacerated wound of scalp; contused arm and chest; much shaken.
92	32	Weaver.	Sept. 1860	Collision.	July 1863, 3 years after.	Fractured tibia and fibula of right leg; much shaken and contused.
93	30	Female, house duties.	Sept. 1860	Collision.	July 1863, 3 years after.	Fracture of tibia and fibula of left leg; fracture of right tibia; much shaken and crushed.
94	60	Female	Dec. 1851	Collision.	July 1863, 12½ years after.	Much shaken, and much contused over right side, abdomen, and right leg.

Duration of Sickness	Present State	Able to follow Employment	Para- lysis	Mental Aberra- tion	Special Senses affected
In bed 7 weeks; on crutches 9 months from weakness of leg.	Feels nothing now but slight lameness from overlapping of the bones.	Yes.	None.	None.	None.
8 weeks off work.	Does not feel any effect of the accident other than the loss of her toe.	Yes.	None.	None.	None.
In bed 11 weeks; off work 12 months from exfoliation of bone in the leg.	Feels slight pain at times in the leg; no effect from the contusion or scalp wound.	Not been able to follow her work as a weaver in consequence of the weakness in the leg.	None.	None.	None.
In bed 11 weeks; bones not united; sent to bed again for 6 weeks; walked on crutches for 12 months.	Feels slight pains in the leg during winter; no other effect.	Yes.	None.	None.	None.
In bed 10 weeks; in 9 months could walk about as well as ever.	Felt slight pains in the left leg for some time; now is quite well and free from pain.	Yes.	None.	None.	None.
In bed 9 weeks; could not use the right leg much for 12 months.	Has varicose veins to a considerable extent in the right leg; also some in the left leg. Wears a plaster and bandage on the right leg.	Feels nothing more than the pain from the varicose veins, which prevent her from doing any work.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
95	60	Labourer.	Dec. 1851	Collision.	July 1863, 12½ years after.	Eye-lid much cut ; head bruised, right knee severely bruised ; much shaken.
96	46	Mid-wife.	Dec. 1861	Collision.	July 1863, 2½ years after.	Had lost her left arm from a machinery accident some years before. In this accident was much crushed and bruised about the back, head, and abdomen ; scalp wound.
97	45	Merchant.	Dec. 1860	Collision.	Aug. 1863, 2½ years after.	Cut on the right side of the head ; lost a great quantity of blood ; was insensible for a short time ; much shaken and bruised.
98	26	Factory worker	Sept. 1860	Collision.	July 1863, 3 years after.	Much cut about the head ; bruised and shaken ; legs contused.
99	38	Labourer.	Sept. 1860	Collision.	July 1863, 3 years after.	Much shaken ; bruised about the head and back ; ankle sprained and contused.

Duration of Sickness	Present State	Able to follow Employment	Paralysis	Mental Aberration	Special Senses affected
2 weeks.	Died five years after the accident from chronic bronchitis.	Yes, 2 weeks after, and until the fatal attack of bronchitis.	None.	None.	None.
In bed 16 weeks; did not feel well for a year.	Has never been laid up since; has been engaged in nursing children, &c.; general health good; thinks her memory not so good as before the accident, but this is not well marked, as she could give a detailed account of events.	Yes.	'Thinks she has not the same control over the rectum as before;' can retain her fæces as before the accident.	None.	None.
3 months.	For 6 weeks after the accident saw objects double; had done so before when dyspeptic; had numbness down the arm and leg, which remained for 2 months; thinks he is mentally more feeble than before the accident; his general health is good.	Yes.	None.	He was able to relate to me a detailed account of a summer excursion on the Continent, and I could not detect any mental defect.	None.
4 weeks.	Worked at his usual occupation after a month, and died of bronchitis 12 months after the accident.	Yes, to a short time before his death.	None.	None.	None.
7 weeks.	Does not feel any effect from the accident.	Yes.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
100	45	Weaver.	Sept. 1860	Collision.	July 1863, 3 years after.	Severe contused wound on forehead; head much contused; was insensible for some time, and delirious for several days; had severe pain over the forehead for 2 months; then went to some work; after fatigue and heat he felt the pain in his head; was put as signal man, but left in consequence of night duty.
101	40	Weaver.	Sept. 1860	Collision.	July 1863, 3 years after.	Severe contusion on the occiput and cervical region of vertebræ; could not open his mouth for 9 days; had great pain at the back of the head for 14 days; these abated, and at the end of 2 months he went to his work.
102	35	Weaver.	Sept. 1860	Collision.	July 1863, 3 years after.	Fracture of right tibia; fracture of fibula, and dislocated left ankle; much shaken; 10 weeks after the accident the tibia had united, overlapping and causing much shortening. Had to walk on crutches for 18 months; now walks with a high-heeled shoe.
103	35	Master tinman	Sept. 1860	Collision.	Aug. 1863, 3 years after.	Much shaken; cut over eyebrow and head; much bruised.
104	30	Engine man.	Sept. 1860	Collision.	Aug. 1863, 3 years after.	Severe scalp wound extending from the ear across the back of the head; much shaken and bruised; confined to the house for 5 or 6 weeks; 16 weeks off work.

Duration of Sickness	Present State	Able to follow Employment	Paralysis	Mental Aberration	Special Senses affected
2 months.	He is a stout, robust man; thinks his memory is not so good as it was before the accident; but he can give a detailed account of many events without evidencing any defect.	Was made a signal-man; has since that time been weaving.	None.	None.	None.
2 months.	During the last 18 months has not felt the least effect from the accident.	Yes.	None.	None.	None.
18 months off work.	Much shortening and deformity; can walk 4 miles at once with the high-heeled shoe.	No, in consequence of shortening of the leg	None.	None.	None.
3 weeks.	Feels no effect, except a slight headache at times; but does not think this is <i>all</i> due to the accident.	Yes.	None.	None.	None.
16 weeks.	Felt nothing since he returned to his work.	Yes.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
105	28	Mechanic	Sept. 1860	Collision.	Aug. 1863, 3 years after.	Contusion and abrasion of left calf; much shaken and bruised.
106	54	Housewife.	Aug. 1860	Collision.	July 1863, 3 years after.	Contused spine, sacrum, and head; shoulders and right leg much bruised, and said to be paralysed; menorrhagia and prolapsus uteri were said to have come on soon after the accident; paralysis of right leg was said to have followed; her own surgeon said 'she deceived 5 medical men by pretending to be paralytic.'
107	32	Weaver.	Sept. 1860	Collision.	Aug. 1863, 3 years after.	Fractured right tibia and fibula; left leg much contused; much shaken; was in bed 8 weeks; off work 12 months.
108	26	Factory worker	Sept. 1860	Collision.	Aug. 1863, 3 years after.	Fracture of right tibia; much shaken.
109	24	Housewife.	Sept. 1860	Collision.	Aug. 1863, 3 years after.	Contusion of chest and side; ecchymosis on the back; much shaken; no spitting of blood; off work 3 weeks.
110	30	Weaver.	Sept. 1860	Collision.	Aug. 1863, 3 years after.	Lacerated wound over the right eye; much contused and shaken generally.
111	35	Factory hand.	Sept. 1860	Collision.	July 1863, 3 years after.	Contused chest; spat blood; much shaken; followed by pneumonia; was at work in a month.

Duration of Sickness	Present State	Able to follow Employ- ment	Para- lysis	Mental Aberra- tion	Special Senses affected
2 weeks.	Felt nothing since he returned to work.	Yes.	None.	None.	None.
Was off work 2 months during the settlement of the case.	Was washing when I saw her; no evidence of paralysis; did not remember the menorrhagia or prolapsus uteri as having followed; said she ceased to menstruate some years before the accident, and had never been 'unwell after;' she has acted as a washer-woman ever since.	Yes.	None.	None.	None.
12 months.	Right leg 2 inches shortened; curved outwards; walks lame; general health good.	Cannot weave from his lameness, but works in the factory	None.	None.	None.
7 months.	Felt no effect; good union.	Yes.	None.	None.	None.
3 weeks.	In good health; felt nothing after the 3 weeks.	Yes.	None.	None.	None.
•					
1 month.	Felt nothing since; is in good health.	Yes.	None.	None.	None.
4 weeks.	Looks well; says he spits blood sometimes in small quantities; is very intemperate in his habits.	Yes.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
112	40	Weaver.	Sept. 1860	Collision.	July 1863, 3 years after.	Much shaken and contused, and severely sprained.
113	42	Stonemason.	Sept. 1860	Collision.	July 1863, 3 years after.	'Head contused; much shaken; right leg and foot much contused.
114	48	Gentleman	Sept. 1860	Collision.	July 1863, 3 years after.	Face and lower jaw much contused; front tooth knocked out; much shaken.'
115	40	Housewife.	Sept. 1860	Collision.	July 1863, 3 years after.	Much shaken and crushed; right leg much contused.
116	30	Factory worker	Sept. 1860	Collision.	July 1863, 3 years after.	Much shaken; 'sprained ankle and torn ligaments.'
117	19	Factory worker	Sept. 1860	Collision.	July 1863, 3 years after.	'Had concussion of the brain; was insensible for 2 or 3 hours; in bed 3 weeks, with deliriousness, fever and pain in the head.'
118	32	Factory worker	Sept. 1860	Collision.	July 1863, 3 years after.	Much shaken and contused; lower jaw fractured.
119	30	Housewife.	Sept. 1860	Collision.	July 1863, 3 years after.	Much shaken; back contused; right thigh fractured.

Duration of Sickness	Present State	Able to follow Employment	Paralysis	Mental Aberration	Special Senses affected
5 weeks.	Does not feel any effect of the accident.	Yes.	None.	None.	None.
3 weeks.	Does not feel any effect of the accident.	Yes.	None.	None.	None.
Felt sore for a month or two.	Does not feel any effect except the loss of his tooth.	Yes.	None.	None.	None.
7 weeks ; walked lame for 4 weeks longer.	Does not feel any effect except slight pain along the dorsum of the right foot after walking.	Yes.	None.	None.	None.
1 month.	Does not feel any effect.	Yes.	None.	None.	None.
7 weeks.	Does not feel any effect ; slight headaches at times ; thinks he does not hear quite so well as formerly. This defect is not very evident.	Yes.	None.	None.	Except slight deafness.
8 weeks.	Does not feel any effect except after hard-drinking, when he has headache : this he had before the accident.	Yes.	None.	None.	None.
15 weeks.	A woman of feeble intellect ; can hardly be made to understand anything. Was delivered of a fine healthy child 6 months ago. Right leg 4 inches shortened ; walks lame, and uses a high-heeled shoe.	Yes.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
120	40	Tailor	Jan. 1859	Collision.	Aug. 1863, 4½ years after.*	Much shaken and contused about back and legs.
121	43	Pawn-broker	Oct. 28 1859	Collision.	Aug. 1863, 4 years after.	Cut over <i>left temple</i> ; much shaken; lost considerable quantities of blood; was kept in a dark room for several weeks; slept badly for 3 weeks; was blind with both eyes for some months, and under treatment for 9 months.
122	38	Musician.	May 1861	Collision.	Sept. 1863, 2½ years after.	Lip, mouth, and gums cut; 3 teeth knocked out from being thrown against his instrument; much shaken and bruised.
123	13	Mill hand.	May 1861	Collision.	Sept. 1863, 2½ years after.	Cut over forehead; much shaken and bruised.
124	16	Mill hand.	May 1861	Collision.	Sept. 1863, 2½ years after.	Right malar bone broken and depressed, face cut, much swollen and ecchymosed generally; much shaken.

* In the cases where death took place before the time of the inquiry, the date given under the head of 'Time of Visit,' is that on which the inquiry was first made; the

Duration of Sickness	Present State	Able to follow Employment	Paralysis	Mental Aberration	Special Senses affected
2 months.	Did not ail anything after a lapse of 2 months up to the time of the death of his wife and child a year ago; then drank very hard, and died of delirium tremens, Feb. 1862.	Yes, up to the time of his excessive drinking.	None.	None.	None.
9 months.	Is now a clerk, engaged in book-keeping; says during the last 12 months he has been laid up 4 months, and was deranged in his mind. Is quite blind with the <i>right eye</i> , pupil irregular, iris adherent, atrophic changes in the fundus oculi; left eye sound; looks pale and feebly nourished; feels nervous and excited, but was always so; habits temperate; has had syphilis.	Is a clerk.	None.	None, <i>evident</i> .	Right eye lost.
6 weeks.	After six weeks was able to work; never ailed anything since, and feels nothing of the accident, except the loss of his teeth. Plays a trombone in a band for a living.	Yes.	None.	None.	None.
2 weeks.	Worked ever since, never ailed anything.	Yes.	None.	None.	None.
2 months.	No effect of the accident felt; is in excellent health.	Yes.	None.	None.	None.

details of symptoms and nature of the accident were obtained from the relations and medical attendant.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
125	58	Mill-hand.	May 1861	Collision.	Sept. 1863, 2½ years after.	Much shaken; severe cut on left side of forehead; was insensible for a short time; could not walk for an hour.
126	28	Gas-fitter.	May 1861	Collision.	Sept. 1863, 2½ years after.	Much shaken; severely cut over left eye; head and back much injured.
127	23	Weaver.	May 1861	Collision.	Sept. 1863, 2½ years after.	Much shaken; back, head, and neck much bruised; could not depress the chin or flex the head for some days.
128	28	Weaver.	May 1861	Collision.	Aug. 1863, 2½ years after.	Blow on cheek; much shaken; was dizzy and nervous; had severe palpitation after, which continued for 3 weeks.
129	28	Weaver.	May 1861	Collision.	Aug. 1863, 2½ years after.	Severe cut over left eye; head bruised; much shaken; was insensible for one night; suffered from pains in the head and back for near 12 months.
130	25	Factory worker	May 1861	Collision.	Aug. 1863, 2½ years after.	Severe blow over the back and sacrum; much shaken; felt sick at the time; could not walk <i>next morning</i> . In bed for 10 weeks; at the seaside for 6 weeks.

Duration of Sickness	Present State	Able to follow Employ- ment	Para- lysis	Mental Aberra- tion	Special Senses affected
3 weeks.	Looks well; is in good health; feels nothing from the accident except pain in the sacral region at times, which she never had before the accident; but she thinks it may be partly rheumatism.	Yes.	None.	None.	None.
3 weeks.	Never complained of anything since the accident; is in excellent health.	Yes.	None.	None.	None.
2 weeks.	Never felt anything after a fortnight; is in good health.	Yes.	None.	None.	None.
3 weeks.	In good health; does not feel any effect of the accident.	Yes.	None.	None.	None.
Off work for 12 months.	Looks healthy and robust; able to attend to her ordinary work; has not felt any effect since about May 1862, except after severe work she at times feels slight pain in the head.	Yes.	None.	None.	None.
4 months, then learned millinery.	Looks in good health, can walk and move her limbs freely; no loss of power or wasting; says in change of weather she feels pains in the right hip and thigh, also in the back, which pass away with rest.	Is a milli- ner now.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
131	42	Agent and school-master	July 1860	Collision.	Sep. 1863, 3 years after.	Severe blow on the back and side; looking out of the window; had a blow on the head; eye much swollen and black; bleeding from the nose; much shaken; felt nervous and could not turn sharply for 2 months; for 5 months could not attend to his duties.
132	45	Poor Law Office <i>em- ployé.</i>	March 1861	Train ran off the line.	Sep. 1863, 2½ years after.	Severe blow on right parietal bone; severely bruised; had concussion of brain; urine dribbled for some time.
133	61	Clerk.	June 1860	Train ran off the line.	Sep. 1863, 3 years after.	Head much knocked and bruised; arms and legs much bruised; much shaken; insensible for a quarter of an hour.
134	34	Clerk.	Nov. 1860	Collision.	Sep. 1863, 3 years after.	Head much cut; bled freely; side bruised and much shaken; felt nervous for a week.
135	32	Clerk.	Dec. 1857	Collision.	Sep. 1863, 6 years after.	'Much bruised on the side and abdomen; 3 ribs said to have been fractured; emphysema, spitting of blood, and pneumonia; in bed 10 days; said to have had double vision, and suffered from the shock and debility for 8 months.'

Duration of Sickness	Present State	Able to follow Employ- ment	Paraly- sis	Mental Aberra- tion	Special Senses affected
5 months.	Is in good health; has slight numbness in the left cheek; had for a time periodical headaches, now quite gone; no effect on his memory.	Yes.	None.	None.	None.
2 months.	Is of full habit, florid; looks like a 'free-liver'; uses glasses to read with, such as a person of his age would require; no trouble with his urine; has had gout since the accident, which he attributes to it.	Yes.	None.	None.	None.
4 weeks.	Does not feel anything he can attribute to the accident, except that he cannot walk the distance he did before it, but thinks this is due to his age; general health good.	Yes.	None.	None.	None.
3 weeks.	Has not felt any effect since he returned to his duties; general health good.	Yes.	None.	None.	None.
8 months.	Is now in good health, and has been for five years; never been unwell since; no evidence of his having been injured.	Yes.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
136	33	Spirit merchant.	Feb. 1857	Collision.	Sep. 1863, $6\frac{1}{2}$ years after.	Head and face much bruised; much shaken; right humerus, radius, and ulna broken; was insensible for half an hour; his elbow had been dislocated some years before, and was partially stiff; arm well in 3 months; pronation and supination impaired.
137	49	Wine merchant.	May, 1854	Collision.	Sep. 1863, 9 years after.	Had been in a severe coach accident and 4 minor railway accidents, in which he was bruised and shaken, but the effects passed off in a few days. In the last accident he had a severe blow on the back of the head; severe lacerated wound on left shin; much shaken and generally bruised; insensible for a few minutes. In a week he was free from head symptoms; leg was 2 months in healing; never unable to attend in some measure to his duties.
138	42	Auctioneer and agent.	Dec. 1857	Collision.	Sep. 1863, 6 years after.	Severe blow on back of head; side bruised; had bleeding from nose and ears; was insensible for half an hour; when he recovered, noticed dimness of vision in left eye, with severe pain in the head; after 2 or 3 weeks the dimness of vision improved in the left eye; returned in about a month with pain; prismatic halo around objects; 2 months after, right eye affected; in 4 months he was quite blind; suffered from severe pain in the

Duration of Sickness	Present State	Able to follow Employment	Paralysis	Mental Aberration	Special Senses affected
6 months.	The right arm is weak and there is loss of pronation, &c., otherwise he does not feel the least effect; memory and special senses all perfect; general health very good.	Yes.	None.	None.	None.
Never quite neglected his duties—was well in 2 months.	Does not feel any effect from his various accidents; memory, special senses, all perfect; has had gout several times since.	Yes.	None.	None.	None.
Blind. Never worked after the accident.	Blind of both eyes; general health good; can walk well; no paralysis; memory and mental faculties healthy.	No.	None.	None.	Blind.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
139	43	Traveller.	1843, 1846, 1848, 1852, 1855.	5 collisions.	Sep. 1863.	head, with tremor, wasting, and some loss of power over the limbs. More or less bruised and shaken about the head and back in all the collisions. In 1855 his knee was much crushed, and was obliged to lay up for 5 weeks, the only time he ever left his work.
140	40	Inn-keeper.	Jan. 1861	Collision.	Oct. 1863, 2½ years after.	Severe contusion of back of head; vomited at the time; had incontinence of urine for some weeks; had to use glasses to read with after the accident; had rheumatism 5 weeks after the accident; an abscess formed on the back of the head; a second one formed on the outer angle of the right eye; lost 13 teeth since the accident, and lost 2 stones in weight; has lived freely; took mercury for his rheumatism.
141	25	Shoemaker.	Dec. 1860	Collision.	Oct. 1863, 3 years after.	Severe blow over the 8th and 9th dorsal vertebræ; bruised about the head and face, very much shaken; could not attend fully to his usual work for 3 months, in consequence of giddiness.
142	40	Housewife.	Dec. 1860	Collision.	Oct. 1863, 3 years after.	Bruised about the head, much shaken; died 9 months after the accident from 'dropsy depending upon heart disease;' had an attack of rheumatism a year before the accident, leaving her with valvular disease of the heart.

Duration of Sickness	Present State	Able to follow Employ- ment	Paraly- sis	Mental Aberra- tion	Special Senses affected
5 weeks.	In very good health; does not feel the least effect from the various accidents in any way, and is as strong as ever he was.	Yes.	None.	None.	None.
Attends to the inn as before.	Looks in good health; has valvular disease left by the rheumatic endocarditis; says he can ride well, but after a long journey feels pains in his back, and is sooner and more affected by drink than he was before the accident; after drink is troubled with his urine, which contains a large quantity of phosphates.	Yes.	None.	None.	None.
3 months.	Looks in good health; married since the accident, and has one child; no effect of the accident remains.	Yes.	None.	None.	None.
2 months, though did her usual work for 5 months.	Died from cardiac dropsy—heart disease following rheumatism.	Yes, for a time.	'None.'	'None.'	'None.'

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
143	35	Shop-keeper	Dec. 1859, and Sept. 1862	Two collisions.	Oct. 1863	Severe blow on head and face, left knee much contused; head symptoms passed off in a few days, in 2 weeks was well. Second accident — Head much bruised, much shaken; felt sick, felt pains in the head for about a week; was well in 3 weeks.
144	19	Collier	Sept. 1858	Collision.	Oct. 1863, 5 years after.	Severe blow on lower part of the spine, much shaken; felt pains in the back on motion for 3 weeks, then went to his work.
145	23	Collier	Sept. 1858	Collision.	Oct. 1863, 5 years after.	Shoulder and back much bruised, and generally shaken; could not work for 5 weeks in consequence of pains in the back, which troubled him at times for 3 weeks after he returned to his work.
146	21	Collier	Sept. 1858	Collision.	Oct. 1863, 5 years after.	Face and head much bruised, lip cut, and one tooth knocked out, much shaken; hip contused.
147	45	Female house duties	Sept. 1858	Collision.	Oct. 1863, 5 years after.	Head much contused, face contused and much swollen, much shaken; felt severe pains in the limbs for 3 weeks; these gradually abated, and in a month she was well.
148	50	Milliner.	Sept. 1858	Collision.	Oct. 1863, 5 years after.	Much shaken, and a severe blow on the middle of the back, which caused her great pain on motion, but this passed off in about 14 days, when she was well.

Duration of Sickness	Present State	Able to follow Employment	Paralysis	Mental Aberration	Special Senses affected
2 weeks first accident; 3 weeks second accident.	Has not felt any consequences of the accidents, and says he is as well as a man can be.	Yes.	None.	None.	None.
3 weeks ailing, but at work.	General health good; never been off work; feels slight pain in the back after fatigue or being a long time at his work in one position.	Yes.	None.	None.	None.
5 weeks.	Is in good health; does not feel any effect in the back, shoulder, or head.	Yes.	None.	None.	None.
2 weeks.	In good health, does not feel any effect.	Yes.	None.	None.	None.
1 month.	Is now in good health; does not feel any effect, except neuralgia at times on one side of the face, which her sister, who was with her in the accident and did not suffer, says is not the side on which she had the blow.	Yes.	None.	None.	None.
14 days.	In good health; no effect.	Yes.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
149	20	Collier	Sept. 1858	Collision.	Oct. 1863, 5 years after.	Severe contusion of spine, much bruised about chest; suffered severe pains in chest and back, which passed away in about 5 weeks, when he returned to his work.
150	73	Gentleman	Dec. 1858	Collision.	Oct. 1863, 5 years after.	Much shaken and contused about the chest, had severe pain in the chest, and spat blood slightly for 2 days; in 5 weeks he felt quite well.
151	70	Lady.	Dec. 1858	Collision.	Oct. 1863, 5 years after.	Had a lacerated wound, extending from right eyebrow to middle of forehead, much shaken and bruised; wound healed in 3 weeks, then she felt well.
152	50	Gentleman	July 1858	Collision.	Oct. 1863, 5 years after.	Lacerated wound on the head, much shaken and bruised; wound healed in 2 weeks, has been well ever since.
153	23	Mechanic	July 1857	Collision.	Oct. 1863, 6 years after.	Severe blow on the forehead, and, in the recoil, had a blow on the dorsal region of the spine; had not much pain; there was very slight ecchymosis, no swelling; felt pains in the back for 2 years after, and was treated for rheumatism, they were principally in the lumbar region, affecting the lumbar fascia; had pains in the arms and chest, sphincters not affected, urine loaded with lithates; took beer freely before the accident; after 2 years could work for 6 hours a day only, in consequence of weakness.

Duration of Sickness	Present State	Able to follow Employ- ment	Paraly- sis	Mental Aberra- tion	Special Senses affected
5 weeks.	In good health; has never felt any effect since he returned to his work.	Yes.	None.	None.	None.
5 weeks.	In good health; has not felt any effect from the accident after the 5 weeks.	Yes.	None.	None.	None.
3 weeks.	Has not felt any effect from the accident since the wound healed, except a slight tenderness over the cicatrix; general health good.	Yes.	None.	None.	None.
2 weeks.	In good health; never felt any effect from the accident after the wound healed.	Yes.	None.	None.	None.
2 years before he could do any work.	General health good; no apparent wasting of the body; has slight antero-posterior curvature of the spine in the middle of the dorsal region, and slight right lateral curvature in the same region; no pain on pressure; no paralysis.	Yes, for a short time— 6 hours per day.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
154	19	Dress-maker.	Nov. 1862	Collision.	Oct. 1863, 1 year after.	Said to have had 'concussion of spine,' chest and abdomen bruised; much bruised generally; had faintings, palpitation, pains in the chest and back; walked out in 5 weeks, and then attended to her work.
155	27	Housewife.	Dec. 1862	Collision.	Oct. 1863, 1 year after.	Had severe contusion of the back, 'affecting the ligaments;' much shaken; in bed 14 days; in 4 weeks well.
156	50	Merchant.	Dec. 1859	Collision.	Oct. 1863, 4 years after.	Lacerated wound on the head; nose, eye, and face much bruised; generally shaken; 'felt considerable dizziness and muddled in the head;' confined to bed 14 days; then returned home; was not properly fit for business for 5 months; but did go occasionally to his warehouse before this time.
157	35	Shipbroker.	Feb. 1857	Collision.	Oct. 1863, 6½ years after.	Severe blow on the head and face; much shaken; felt severe pains in the head and eye, which prevented him from attending to business for 4 months, and after that only partially.

Duration of Sickness	Present State	Able to follow Employ- ment	Paraly- sis	Mental Aberra- tion	Special Senses affected
5 weeks.	General health good, and does not feel any effect, except at times she has pains in her stomach.	Yes.	None.	None.	None.
4 weeks.	General health good; does not feel any effect, except after severe exertion <i>slight pains</i> in the back.	Yes.	None.	None.	None.
5 months.	General health good; says that at times on holding his head down he feels dizzy. Has rheumatism in the knee and shoulder.	Yes.	None.	None.	None.
4 months.	In bad health. Has melanosis of the eye, which existed before the accident, I was told by the surgeon; this gives him great pain, and prevents him from attending much to business.	Yes.	None.	None.	None, except the left eye being lost from melanosis, a disease that existed before the accident.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
158	49	Mariner.	Dec. 1857	Collision.	Oct. 1863, 6 years after.	Severely shaken and contused about the back.
159	50	Solicitor.	Aug. 1860	Collision.	Oct. 1863, 3 years after.	Much shaken, and right arm much contused.
160	42	Grocer.	Dec. 1858, and Oct. 1859	Collision. Run off.	Oct. 1863	Head bruised; side and thighs contused, much shaken. In the second accident he was bruised about the head and chest, and shaken.
161	37	Timber merchant.	July 1856	Collision.	Oct. 1863, 7 years after.	Head much cut and bruised; chest bruised, and several ribs fractured; both legs much bruised and cut; much shaken; insensible for a time; recognised his wife when she got to the place. Was 5 weeks at the Station Hotel, and 17 weeks before he could move out; wounds then healed. Still could not walk with crutches. July 1857, 12 months after, went into the country, and could walk with crutches; was thought to be permanently paralytic. In 2 years he could walk without a stick; no wasting of limbs; urine dribbled; for 12 weeks had no control over the rectum. Memory was affected for a year, and he wore glasses, after his return home, to read with.

Duration of Sickness	Present State	Able to follow Employ- ment	Paraly- sis	Mental Aberra- tion	Special Senses affected.
1 month.	Complained at times of pains in the back for 12 months, but went to sea a month after the accident, and has never ailed anything since.	Yes.	None.	None.	None.
14 days.	Walked lame for a month or 6 weeks, in consequence of stiffness of the knee; has never suffered anything since.	Yes.	None.	None.	None.
8 days the 1st accident, and 4 days the 2nd.	Was able to attend to all his duties perfectly within 14 days of each accident, and has not felt the slightest effect since.	Yes.	None.	None.	None.
Over 2 years.	Was of intemperate habits before the accident, and since his recovery has indulged to excess, having had frequent attacks of delirium tremens, and is constantly watched to prevent his drinking. When I saw him he was in a state of delirium tremens and had been drinking for 2 months almost constantly. No paralysis or loss of nerve power evident, except what is due to his habit.	Yes.	None.	None, except from drink.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
162	49	Agent.	July 1856	Collision.	Oct. 1863, 7 years after.	Left side of head contused; back of neck much contused; generally shaken; was insensible for an hour; says he could neither see, hear, nor speak well for two months after the accident; suffered from dizziness for some months.
163	50	Farmer.	July 1856	Collision.	Oct. 1863, 7 years after.	Severe blow on the middle of the back; cut over right temple; much shaken; had slight dizziness; said 'if he had been idle and laid up, would have been worse than case 162;' felt pain in the back for about a month.
164	58	Farmer.	March 1861	Collision.	Oct. 1863, 2 years after.	Severe blow on the head and face; nose much crushed; bled excessively; nasal bones protruded; no laceration or contusion in any other parts of the body; fainted from loss of blood; nasal bones were adjusted; anterior and posterior nares plugged; suffered from giddiness for three months; was 6 months unfit for his ordinary duties.

Duration of Sickness	Present State	Able to follow Employ- ment	Paraly- sis	Mental Aberra- tion	Special Senses affected.
12 months.	Is in good health, well nourished, active, speaks well and collectedly; can give a most connected and detailed account of his injuries and suffering; says he is 3 stone lighter than before the accident, and does not feel any effect, except from cold and damp, which cause dizziness and fatigue. His occupation before the accident was a sedentary one; it is now active. His neighbours say he looks better than ever he did, and is more active.	Yes, but changed to more active employment.	None.	None.	None.
1 month.	Cannot say that he feels anything, except that he gets fatigued sooner than he did formerly (may this not be due to age?) and feels slight pain in back after prolonged stooping. General health good.	Yes.	None.	None.	None.
6 months.	His surgeon says he has enjoyed his customary health ever since he returned to his duties; is stout, robust, and plethoric; no worse since the accident, and feels nothing, except a slight sensation of 'whirring in the ear, which causes a little deafness.'	Yes.	None.	None.	None, except the 'whirring in the ear'

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
165	27	Medical man.	Aug. 1858, May 1861	Collision. Collision.	Oct. 1863	In the 1st accident,—severe contusion over the nose, with bleeding, contusion of forehead, cut knee, several bruises about the legs. 2nd accident,—shaken, shoulder and legs bruised.
166	45	Manufacturer.	Sept. 1859	Collision.	Oct. 1863, 4 years after.	Much shaken, bruised about the head and back; felt pains in the back for about 3 weeks.
167	50	Merchant.	Sept. 1860	Collision.	Oct. 1863, 3 years after.	'Much shaken and inwardly bruised, felt nervous and giddy,' was laid up about 3 weeks.
168	40	Traveller.	Sept. 1860	Collision.	Oct. 1863, 3 years after.	Severely shaken, contused about the head and back; felt pains in the head and back, with dizziness, for two weeks.
169	45	Traveller.	Dec. 1860	Collision.	Nov. 1863, 3 years after.	Bruised about the head and back, much shaken; suffered from headache and feeling dizzy for 3 weeks; had a cough before the accident, and was delicate; returned to his employment in 6 weeks.

Duration of Sickness	Present State	Able to follow Employ- ment	Paraly- sis	Mental Aberra- tion	Special Senses affected
Never laid up	In good health, has not at any time suffered any bad effect from the acci- dents.	Yes.	None.	None.	None.
3 weeks.	In good health, has never felt any ill effect from the accident.	Yes.	None.	None.	None.
3 weeks.	General health seems good; looks florid and ro- bust, with considerable bodily activity, would not say he felt anything or give an account, for fear if he should be in another acci- dent, his subsequent symp- toms might be attributed to it.	Yes.	None.	None.	None.
2 weeks.	General health good; has never felt any ill effect from the accident.	Yes.	None.	None.	None.
6 weeks.	After he returned to his duties attended to them for about 18 months, then took cold, cough became more troublesome, lost flesh, wasted away, and died about 6 weeks ago, from phthisis.	Yes, for a time.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
170	50	Merchant.	April 1860	Collision.	Nov. 1863, 3½ years after.	Much shaken, head bruised, clavicle and 3 ribs fractured; suffered from severe pains in the head and side for some weeks; was six months before he could attend fully to his business.
171	50	Painter	April 1860	Collision.	Dec. 1863, 3½ years after.	Severely contused about the head and face, much shaken; suffered from headaches and dizziness; was in bed 5 weeks, away from work 6 months.
172	47	Traveller.	Dec. 1858, and Nov. 1861	Collision. Collision.	Dec. 1863	First accident — Head bruised, eye much inflamed, generally shaken; off work 2 weeks. Second accident — Much shaken, right knee much bruised; off work 6 months.
173	31	Traveller.	Nov. 1861	Collision.	Dec. 1863, 2¾ years after.	Much shaken, had slight 'concussion of the spine:' suffered pain in the back for two weeks, then went to his duties.
174	30	Female house duties	Jan. 1861	Collision.	Dec. 1863, 2¾ years after.	Was in 5th month of pregnancy; was much shaken and bruised about the abdomen, felt nervous and excited for some weeks, confined to bed for 14 days; went to full term of her pregnancy, labour was natural, child born alive and healthy.

Duration of Sickness	Present State	Able to follow Employment	Paralysis	Mental Aberration	Special Senses affected
6 months.	Is a stout, healthy, robust-looking gentleman; says he does not feel any effect from the accident, except a little stiffness of the left arm where the clavicle was fractured, also a slight and occasional pain in the side where the ribs were fractured.	Yes.	None.	None.	None.
6 months.	General health good; never ailed anything for more than two years, and never was better.	Yes.	None.	None.	None.
2 weeks first accident; 6 months second accident.	General health good, no effect, no lameness or stiffness of the knee.	Yes.	None.	None.	None.
2 weeks.	General health good, does not feel any effect.	Yes.	None.	None.	None.
14 days.	Is in good health, and has not suffered anything from the accident after the 14 days.	Yes.	None.	None.	None.

No.	Age	Occupation	Time of Accident	Kind of Accident	Time of Visit	Nature of Injuries
175		Female house-keeper	Sept. 1864	Collision.	Sept. 1864	Blow on shoulder and back; attended to her duties with some pain and difficulty for 3 or 4 days; uterine hæmorrhage came on, she had been irregular before. No examination per vaginam by her surgeon, she died after several returns of the bleeding, about 6 weeks after the accident; inquest and post mortem examination by an independent surgeon. Verdict was—'Died from passive effusion into pericardium, connected with fatty heart, death not in any way accelerated by the accident.'

Duration of Sickness	Present State	Able to follow Employ- ment	Paraly- sis	Mental Aberra- tion	Special Senses affected
Died.	For 3 days went about her work, until weakened by the uterine hæmorrhage, then laid up for a time; the bleeding returned after some exertion, and she died suddenly on the 21st of October.	Yes, for a time.	None.	None.	None.



INDEX.

ACCIDENTS, 49

- number of, 50, 51
- — — in France, 50, 57, 61
- — — United Kingdom, 51
- — — Prussia, 59
- — — America, 59
- unavoidable, 65
- nature of, 73
- Appendix, 113

Blows and cuts on various parts of the body, 86
Bronchitis, 28

Causes of death after railway accidents, 73

Cholera, 12, 28

Clavicle, fracture of, 81

Coach travelling, 2, 61

— — dangers of, 10

Compensation, amount of, 70

Concussion of spine, 90, 91, 96

Consequences of fractures of the leg, 85, 86

Cramps, 27

Cystitis, 28

Deaths from railway accidents in London, 62

— — — compared with other causes, table, 15

Death-rate from nervous diseases, 71

Deaths following railway accidents, 73

Diarrhœa, 28

Diabetes after an accident, 75

Differential diagnosis, 105

Diminished labour of *employés*, 70

Diseases of nervous system, 14, 34

Drivers and stokers, 20

Ears, affections of, 47

Erichsen, Mr., views on spinal injuries, 96

Eyes, affections of, 45

Femur, fractures of, 83

Fevers, 43

— intermittent, 12, 28, 41, 44

— typhoid, 28

Fluctuation in number of accidents, 70

Fractures, the kind of, 76

— doubtful, 76

Inflammation of spinal cord and membranes, 99

— — — — causes of, 101

Injuries to nerve centres, 88, 89

Jaundice, 28

Leg, fractures of, peculiarities of, 85

Loss of life from imprudence of passengers, 68

Lower jaw, fracture of, 80

Lumbago, 26

Maladie des Mécaniciens, 26, 36

Malar bone, fracture of, 77

— — peculiarity of blows on, 78

Medical opinions, 108

Neuralgia, 27

Officials, railway, 17

Pathology of railway accidents, 96

Percentage of deaths after railway accidents, 74

Phthisis, 28

G. L. SIMMONS MEDICAL LIBRARY

184

INDEX.

- | | |
|---|--|
| <p>Pleurisy, 28
Pneumonia, 28
Proportion of <i>employés</i> to mileage, 66
— of passengers killed and injured, 68
— — — — table, 69

Radius, fractures of, 83
Railways in Great Britain, miles
 working, 1
 — history of, 4
 — Liverpool and Manchester, 5
 — London and Birmingham, 8
 — objections to, 10
 ‘Railway spine,’ 93
 ‘Railway doctors,’ 107
Remuneration of servants, 66
Rheumatism, 26, 41
Ribs, fracture of, 81</p> | <p>Season-ticket holders, 68
Speed of trains, 66
Statistics, importance of, 4
Stokers, <i>see</i> drivers
Sugar in urine after accidents, 75
System, nervous, 14, 34

Table of mileage, passengers killed
 and injured, &c., 69
Tibia and fibula, fractures of, 85
Tram-roads, 3
Travellers, commercial, 16

Upper jaw, fractures of, 79
— — peculiarities of, 80

Varicose veins after accidents, 87</p> |
|---|--|

LONDON

PRINTED BY SPOTTISWOODE AND CO.

NEW-STREET SQUARE



LANE MEDICAL LIBRARY

To avoid fine, this book should be returned on
or before the date last stamped below.

--	--	--

M141

F61

1867

Fletcher, J.O. 38034
Railways in their med-
ical aspects.

NAME

DATE DUE

